DOCUMENT RESUME

ED 303 651 CE 051 924

TITLE	Industrial Arts Instructional Task/Competencies for Woods Technology. Competency-Based Education.
INSTITUTION	Arlington County Public Schools, Va.; Henrico County Public Schools, Glen Allen, VA. Virginia Vocational Curriculum Center.
SPONS AGENCY	Virginia State Dept. of Education, Richmond. Div. of Vocational and Adult Education.
PUB DATE	85
CONTRACT	VA-80-C0132-3-AD-001A
NOTE	188p.; For related documents, see ED 301 648, ED 301 670, ED 301 675, ED 302 669, and CE 052 024.
AVAILABLE FROM	Virginia Vocational Curriculum and Resource Center, 2200 Mountain Road, Glen Allen, VA 23060 ($11.10).
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01/PC08 Plus Postage.
DESCRIPTORS	Behavioral Objectives; *Competency Based Education; *Course Content; Course Descriptions; Course Organization; Educational Resources; Industrial Arts; Job Skills; Postsecondary Education; Program Descriptions; Secondary Education; State Curriculum Guides; *Task Analysis; Vocational Education; *Woodworking

ABSTRACT

This instructional task/competency package is designed to be used in combination with the "Industrial Arts Guide to Competency Based Education Implementation" in order to implement competency-based education in the Woods Technology I and II courses in Virginia. The task/competency package contains suggested task sequence listings, content outlines, and task/competency information for the specific courses, Woods Technology I and II. Part 1 of this publication contains descriptions of the industrial arts program and courses, instructional task/competency lists, and content outlines for two woods technology courses. The task/competency lists include the minimum task/competencies identified for inclusion in the courses, listed in a suggested order of instruction. The task/competency outlines correspond with the task/competencies identified in Part 1. The following information is provided for each task/competency: appropriate program and course designation, performance and enabling objectives, a criterion-referenced measure, and suggested activities and aids for instruction. Appendixes list educational resources. (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED303651

Industrial Arts Instructional Task/Competencies for Woods Technology

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☑ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Commonwealth of Virginia
Department of Education
Vocational and Adult Education
Richmond, Virginia 23216

1985

BEST COPY AVAILABLE

Review Draft

COMPETENCY-BASED
CBE
EDUCATION

CE051924

GUIDE APPLICATION

This guide has been prepared for use in developing and selecting instructional materials and in implementing competency-based education for the following program and courses:

Program	Course
INDUSTRIAL ARTS (CIP Code 21.0199)	WOODS TECHNOLOGY I (ICE) (VA #8449) WOODS TECHNOLOGY II (VA #8452)

Additional information concerning the application and use of this guide in program planning and development may be obtained from:

Industrial Arts Service
Department of Education
P.O. Box 6Q
Richmond, Virginia 23216

INDUSTRIAL ARTS INSTRUCTIONAL TASKS/COMPETENCIES

FOR

WOODS TECHNOLOGY

PROJECT DIRECTOR

Mildred Andra Witten

This guide was developed by Arlington Public Schools for the Virginia Department of Education, Divisions of Vocational and Adult Education under the provisions of the Vocational Education Amendments of 1976 (Public Law 94 -482) and Competency-Based Education Contract #VA80-C-132-3-AD-001A, Subpart 3, Section 32, Exemplary.

The Industrial Arts Instructional Tasks/Competencies for Woods Technology replaces the Instructional Resource Guide for Woods Technology and should be used in conjunction with the Industrial Arts Guide to CBE Implementation.

1985

FOREWORD

In the next decade, businesses and industries in Virginia will require large numbers of skilled workers. Therefore, vocational education at the secondary and postsecondary levels will have the responsibility of preparing individuals for a variety of occupations.

Competency-based education (CBE) provides the preparation students need for entry into the Virginia work force. The CBE practice of recording competencies developed by students helps them to make a smooth transition between secondary and postsecondary programs when both levels of education are required for career training. In addition, CBE is effective in retraining workers who have been displaced because of changing technology.

This guide will assist teachers and administrators in developing instructional materials that meet the needs of students and industry and comply with the Virginia CBE standards for vocational and adult education.

S. John Davis
Superintendent of Public Instruction

Melvin H. Garner
Administrative Director
Vocational and Adult Education

5

ACKNOWLEDGMENTS

The development and completion of this guide have required a vast expenditure of time, effort, and teamwork by the project staff and participants. The teachers who served as researchers and writing team members for the guide deserve recognition for their dedication, time, and expertise:

William Cochran, Swanson Intermediate School
Carl Greene, Thomas Jefferson Intermediate School
Prince Pope, Yorktown High School
Clifton Clark, Jr., Gunston Center

The following consultants provided valuable advice and assistance to the writing team members:

Arvid Van Dyke, Curriculum Specialist, James Madison University
George R. Willcox, Supervisor, Industrial Arts Service
Virginia Department of Education

Appreciation is expressed also to Mildred Andra Witten, Project Director, for her management of the project. She was assisted in the review process by the following Arlington Public Schools personnel:

William P. Young, Vocational Director
Wade Morrison, Supervisor, Industrial Arts Education
Edwina K. Lake, Editor

Dr. Kay B. Brown, Vocational Curriculum Development Supervisor, Virginia Department of Education, is recognized for coordinating the final publication process. The organization and editorial revisions necessary to prepare the manuscript for publication were performed by the Virginia Vocational Curriculum Center, administered by Henrico County Public Schools, Department of Vocational and Community Education:

Flora C. Armstrong, Project Director
Anita T. Cruikshank, Writer/Editor
Suzanne H. Bower, Writer/Editor

Special recognition is given to the students of the Henrico Trade Center of the Henrico County Public Schools, Department of Vocational and Community Education. Under the supervision of William D. Burton, printing instructor, these students printed, assembled, packaged, and prepared the guide for distribution.

Dewey T. Oakley, Jr., Director
Vocational Program Services
Virginia Department of Education

Thomas A. Hughes, Associate Director
Vocational Program Services for
Industrial Arts Education

CONTENTS

Page

INTRODUCTION 1

PART 1--PROGRAMS AND COURSES

Introduction 3
Overview of Industrial Arts Education Program 4
Program Description 8
Course Description and Task/Competency Sequence for Woods Technology I 9
Course Outline, Woods Technology I 11
Course Description and Task/Competency Sequence for Woods Technology II 13
Course Outline, Woods Technology II 15

PART 2--TASK INVENTORY

Introduction 17
Content/Concept Area Listing 19
Exploring Wood Technology and Industries 21
Organizing Safety and Laboratory Management Systems 27
Using Wood Science 33
Using Lumber 43
Using Processed Woods 51
Planning a Project 57
Measuring and Laying Out Work 73
Using Hand Tools 79
Using Fasteners and Cabinet Joints 93
Preparing Surfaces for Finishes 103
Finishing Wood 109
Using Power Tools 117
Using Portable Power Tools 141
Reconditioning Furniture 153
Integrating the Student Organization Throughout the Course 159

BIBLIOGRAPHY 171

APPENDICES

Appendix A: Audiovisual Aids 175
Appendix B: Project Ideas and Sources 181
Appendix C: Resources for Research in Woods Technology 185
Appendix D: Approved Tools and Equipment 187

INTRODUCTION

This instructional task/competency package is designed to be used in combination with the Industrial Arts Guide to CBE Implementation in order to implement competency-based education in the Woods Technology I and II courses. The implementation guide contains information that pertains to all courses within the industrial arts area; the sections of that publication are titled Career Decision-Making Information, Student Organization (AIASA), Classroom Management Systems, and Recording Systems. This task/competency package contains suggested task sequence listings, content outlines, and task/competency information for the specific courses, Woods Technology I and II. Detailed instructions for combined use of these two publications are contained within the Industrial Arts Guide to CBE Implementation.

Using the Task/Competency Package

Part 1 contains descriptions of the Industrial Arts program and courses, instructional task/competency lists, and content outlines for Woods Technology I and II. The task/competency lists include the minimum task/competencies identified for inclusion in the courses, listed in a suggested order of instruction. The content outlines correspond with the task/competency lists in content and sequencing. However, within the outline, tasks are identified in topical form and related tasks are grouped into broader topics of instruction.

Part 2 contains information for instruction in each of the task/competencies identified in Part 1. The following information is provided for each task/competency: appropriate program and course designation, performance and enabling objectives, a criterion-referenced measure, and suggested activities and aids for instruction.

It is suggested that the Part 1 task sequence lists and course content outlines be reviewed initially so that any additional tasks may be added, any extraneous tasks may be deleted, and any desired changes in sequencing of instruction be made. Once the sequencing is confirmed, lesson planning and implementation may proceed through referral to the Part 2 task/competency sheet noted beside each instructional topic within the outline.

PART 1

PROGRAMS AND COURSES

The course descriptions, content outlines, and suggested task sequences contained in this section were developed using the validated task inventory presented in Part 2 of this guide. The program and courses have been approved by the Virginia Department of Education.

The course outlines have been cross-referenced with the task/competency information sheets to assist the teacher in identifying instructional objectives, materials, criterion standards, and reference materials.

OVERVIEW OF INDUSTRIAL ARTS EDUCATION PROGRAMS[1]

The Industrial Arts Education offerings are provided to assist the student in developing an understanding about industry and technology and in the discovery and development of individual potential. There are two types of industrial arts programs designed for the secondary school level:

1. Orientation and Exploration--designed for grades 7 through 9, this program assists students in making informed and meaningful occupational and educational choices. The program, designed for the middle or junior high school, provides the student with a broad base of try-out experiences and insights into career opportunities. It gives a basis for personal assessment of work interests and aptitudes. Instruction at this level places emphasis upon the following:

    a. Using the tools, equipment, materials, and products associated with industry and technology

    b. Role playing in simulated enterprises associated with a number of the career clusters

    c. Studying and analyzing the materials, products, processes, problems, uses, developments, and contributions of many of the elements making up career clusters

    d. Studying the organization of numerous industries or businesses while experiencing typical aspects of many

    e. Researching, planning, designing, constructing, evaluating, and generalizing in association with problems and projects related to various career clusters.

2. Technical Adaptability--designed for grades 9 through 12, this program prepares students for vocational and technical career decisions. The senior high school program provides students with competencies which will result in an occupational readiness and responsible citizenship useful for the future craftsperson, technician, engineer, or consumer. It provides a foundation for career preparation either at the secondary or postsecondary level. The senior high program complements the middle or junor high school offering by completing a sequence of opportunities to learn about the industrial and technological aspects of society. Instruction in the program places emphasis upon the following:

    a. Preparing for enrollment in advanced technical or occupational programs

---

[1] Division of Program Services and Division of Administrative Services and Continuing Education, Vocational Education Student Planning Guide (Richmond: Virginia Department of Education).

b. Understanding industry and technology and their place in society and the free enterprise system

c. Understanding industrial processes and the practical application of scientific principles

d. Developing basic skills in the proper use of common industrial tools, materials, and processes

e. Solving problems creatively, using the materials, processes, and products of industry.

Activities of the American Industrial Arts Student Association (AIASA) are included as a part of the instructional program to promote leadership qualities, high standards of work performance, scholarship, and safety. Teachers integrate AIASA experiences within their instruction by providing students with the following:

a. An involvement with the community's industrial and technical resources

b. Activities in parliamentary procedures and democratic decision-making

c. Recognition for exemplary performance, work skills, and safety procedures.

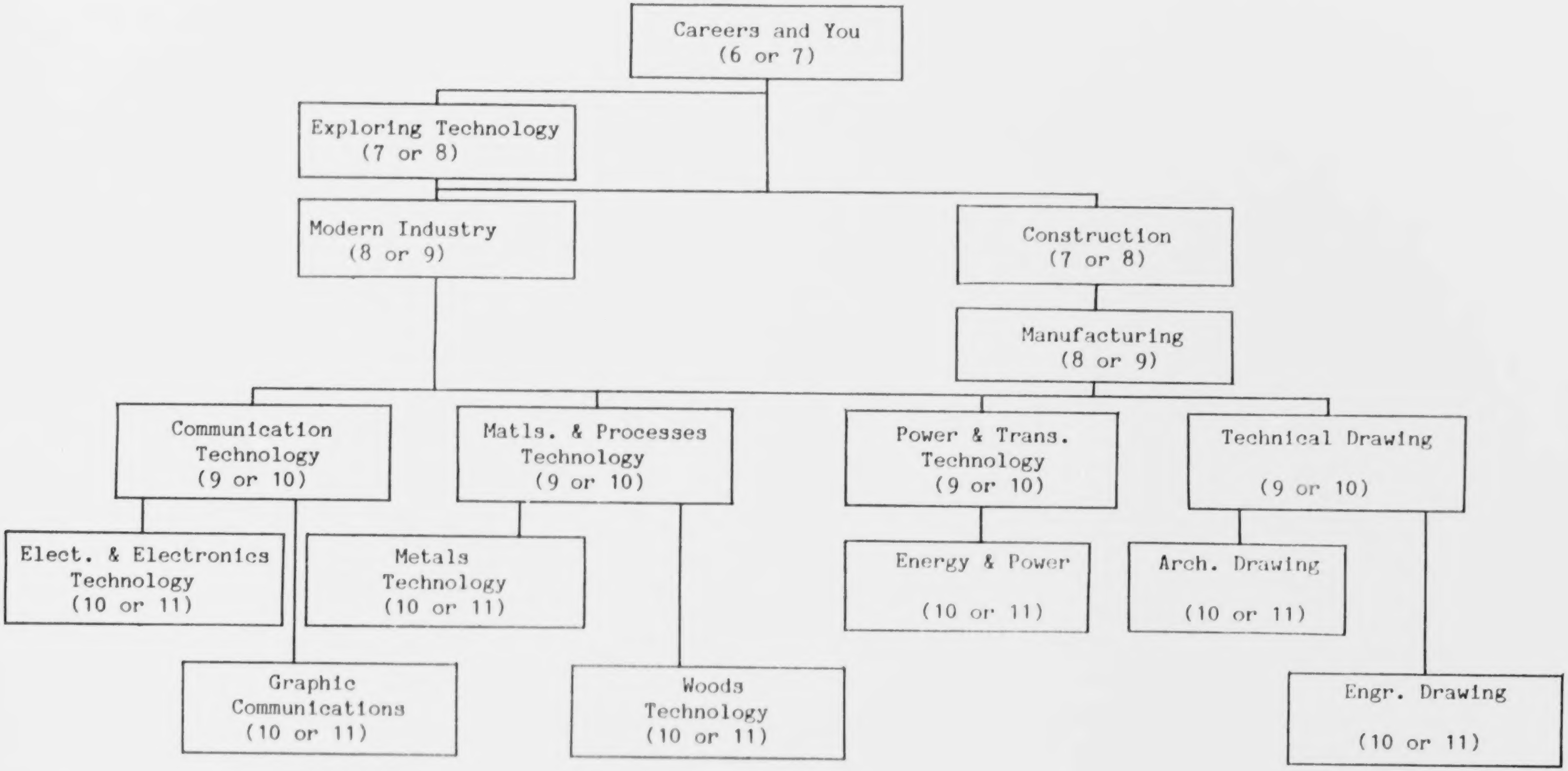
THE INDUSTRIAL ARTS CURRICULUM

LEVEL	GOAL	PROGRAM
Elementary School	Learning Reinforcement	Industrial Arts activities integrated within the elementary curriculum
Middle or Junior High School	Orientation and Exploration	Exploring Technology Modern Industry Construction Manufacturing
High School	Technical Adaptability	Phase I Basic Technical Drawing Communication Technology Materials and Processes Technology Power and Transporation Technology Phase II Architectural Drawing Electricity and Electronics Technology Energy and Power Engineering Drawing Graphic Communications Metals Technology Woods Technology

INDUSTRIAL ARTS EDUCATION PROGRAMS

PROGRAMS	AVAILABLE COURSES	CODE	SUGGESTED GRADE	NO. WEEKS
Occupational Orientation (Pre-exploratory)	A World of Choice: Careers and You	8475	6 or 7	36 or 18
Orientation and Exploration	Exploring Technology (18 or 36 weeks)	8464	7, 8, or 9	18
		8461	7, 8, or 9	36
	Modern Industry (18 or 36 weeks)	8463	7, 8, or 9	18
		8462	7, 8, or 9	36
	Construction (18 or 36 weeks)	8432	7, 8, or 9	18
		8431	7, 8, or 9	36
	Manufacturing (18 or 36 weeks)	8426	7, 8, or 9	18
		8425	7, 8, or 9	36
Technical Adaptability (Phase One)	Communication Technology	8415	9 or 10	36
	Materials and Processes Technology	8433	9 or 10	36
	Power and Transportation Technology	8445	9 or 10	36
	Basic Technical Drawing	8435	9 or 10	36
(Phase Two)	Architectural Drawing	8347	10 - 12	36
	Electricity & Electronics Technology	8416	10 - 12	36
	Energy and Power	8448	10 - 12	36
	Engineering Drawing	8436	10 - 12	36
	Graphic Communications	8458	10 - 12	36
	Metals Technology	8439	10 - 12	36
	Woods Technology	8449	10 - 12	36
Alternati[illegible] (Vocation[illegible]enters	Industrial Occupational Expl[illegible]tion (ICE)	8472	9 or 10	36

SUGGESTED SEQUENCES OF OFFERINGS*
INDUSTRIAL ARTS EDUCATION


Careers and You (6 or 7)
Exploring Technology (7 or 8)
Modern Industry (8 or 9)
Construction (7 or 8)
Manufacturing (8 or 9)
Communication Technology (9 or 10)
Matls. & Processes Technology (9 or 10)
Power & Trans. Technology (9 or 10)
Technical Drawing (9 or 10)
Elect. & Electronics Technology (10 or 11)
Metals Technology (10 or 11)
Energy & Power (10 or 11)
Arch. Drawing (10 or 11)
Graphic Communications (10 or 11)
Woods Technology (10 or 11)
Engr. Drawing (10 or 11)

*This chart is recommended for student guidance and is used to suggest best sequence of courses.

SECONDARY PROGRAMS AND COURSES

PROGRAM TITLE: INDUSTRIAL ARTS

DESCRIPTION: This program provides students with competencies which will result in an occupational readiness and responsible citizenship useful for the future craftsperson, technician, engineer, or consumer. It provides a foundation for career preparation and a sequence of opportunities to learn about the industrial and technological aspects of society. Instruction in the program places emphasis upon the following:

- Preparation for enrollment in advanced technical or occupational programs
- The role of industry and technology in society and the free enterprise system
- Industrial processes and the practical application of scientific principals
- Skill development in the proper use of common industrial tools, materials, and processes
- Problem-solving and creativity involving the materials, processes, and products of industry.

CIP CODE: 21.0199

SUGGESTED GRADE LEVEL: 10-12

APPROVED COURSE	VA COURSE CODE	DOTE CODE/TITLE
Woods Technology	8449	N/A
Options		
Woods Technology I	8449	N/A
Woods Technology II	8452	N/A

WOODS TECHNOLOGY I (8449)

Description

Course Description:	Woods Technology I is a one-period-a-day, 36-week laboratory course of the second-level senior high school technical program for students needing additional preparation before enrolling in an occupational program. Students design, plan, and build wood products as they study the woodworking industry. Students use both hand tools and power equipment to develop technical skills and an understanding of manufactured products and the fundamentals of woods technology.
Prerequisites:	NONE
Suggested Grade Level:	10 - 12

*Source: Vocational Education Student Planning Guide

Suggested Task/Competency Sequence

---

*1.1	Explore woodworking occupations
1.2	Identify (establish) personnel management systems
*2.1	Identify safety rules and use lab tools and machines safely
*2.2	Participate in organized personnel system to manage class and laboratory activities
*15.1	Participate in AIASA classroom activities
*15.2	Investigate community industrial and technical resources
15.3	Participate in school (or community) improvement activities
3.1	Identify wood structures
3.2	Differentiate between hardwoods and softwoods
3.3	Describe tree structure
3.4	Identify wood grains
4.1	Describe lumber seasoning
4.2	Identify lumber defects and causes
4.3	Compute board feet
5.1	Describe characteristics of plywoods and veneers
5.2	Describe characteristics of hardboard, fiberboard, and laminates
6.1	Select project and list steps for making the project
6.2	Make drawings
6.3	Fill out bill of materials
6.4	Complete project planning sheet
7.1	Identify measuring and layout tools and terms
7.2	Measure and lay out work, using English and metric systems
8.1	Use hand saws
8.2	Use hand planes
8.3	Use chisels, gouges, and carving tools
8.4	Use surform tools and wood files
8.5	Use hand scrapers and cabinet scrapers
8.6	Use hand boring tools and drilling tools
9.1	Select and use nails and screws
9.2	Select and use fasteners
9.3	Identify adhesive types and uses

*On-going activities

Suggested Task/Competency Sequence

10.1 Repair or fill surface of wood
10.2 Select and use abrasives
11.1 Select and apply wood stains
11.2 Select and apply paint
11.3 Select and apply transparent finishes
12.1 Use scroll/jig saws
12.2 Use band saw
12.3 Use table (circular) saw
12.4 Use drill press
13.1 Use portable electric drills
13.2 Use electric hand sanders
13.3 Use saber saw
*15.4 Participate in group marketing enterprise project
*15.5 Plan and participate in competitions

*On-going activities

WOODS TECHNOLOGY COURSE OUTLINES

Outline and Code
for
WOODS TECHNOLOGY I

Course Outline	Task/Competency Code
I. Introduction to Woods Technology	
A. School and Industrial Arts policies	
B. Wood-related careers and personnel	1.1
1. Work modes	E1.1.3
2. Career information	E1.1.2
3. Occupations in wood-related industries	E1.1.1
C. Management and personnel systems	1.2
D. Safety with tools and materials	2.1
E. Laboratory organization	2.2
F. Student organization committees (AIASA)	15.1-15.3
II. Wood Science	
A. Wood structure	3.1
B. Hardwoods and softwoods	3.2
C. Tree structure	3.3
D. Wood grains	3.4
III. Lumber and Processed Woods	
A. Industrial lumber seasoning methods	4.1
B. Lumber defects	4.2
C. Lumber measurement	4.3
D. Plywood and veneers	5.1
E. Hardboard, fiberboard, and laminates	5.2
IV. Design Principles and Techniques of Project Planning	
A. Design and planning process	6.1
B. Project selection	6.1
C. Pictorial and multiview drawings	6.2
D. Bill of materials	6.3
E. Project planning sheet	6.4
V. Measurement and Layout Techniques	
A. Measuring and layout tools and terms	7.1
B. English and metric systems of measurement	7.2
C. Measurement and layout work	7.2

Course Outline	Task/Competency Code
VI. Basic Hand Tool Processes	
A. Hand saws	8.1
B. Hand planes	8.2
C. Chisels, gouges, and carving tools	8.3
D. Surform tools and wood files	8.4
E. Scrapers	8.5
F. Boring and drilling tools	8.6
VII. Fasteners	
A. Nails and screws	9.1
B. Mechanical fasteners	9.2
C. Adhesives	9.3
VIII. Wood Finishing	
A. Wood fillers	10.1
B. Surface preparation	10.2
C. Wood stains	11.1
D. Paint	11.2
E. Transparent finishes	11.3
IX. Introduction to Power Tools	
A. Scroll/jig saws	12.1
B. Band saws	12.2
C. Table saw	12.3
D. Drill press	12.4
E. Portable electric drills	13.1
F. Electric hand sanders	13.2
G. Saber saw	13.3
X. The Industrial Arts Student Organization	
A. Group marketing enterprise	15.4
B. Contests and achievement recognition	15.5

WOODS TECHNOLOGY II (8452)

Description

Course Description	Woods Technology II is a one-period-a-day, 36-week laboratory course which prepares students for enrolling in advanced occupational preparation programs. Students design, plan and make cabinet or recreational wood products using machine tools, processes, and wood technology. Creativity is emphasized as students further develop their interests, talents, and technical abilities in woodworking or related areas of woods technology.
Prerequisites:	8449
Suggested Grade Level:	10 - 12

*Source: Vocational Education Student Planning Guide

Suggested Task/Competency Sequence

*1.1	Explore woodworking occupations
*1.2	Identify (establish) personnel management systems
*2.1	Identify safety rules and use lab tools and machines safely
*2.2	Participate in organized personnel system to manage class and laboratory activities
*15.1	Participate in AIASA classroom activities
*15.2	Investigate community industrial and technical resources
15.3	Participate in school (or community) improvement activities
6.1	Select project and list steps for making the project
6.2	Make drawings
6.3	Fill out bill of materials
6.4	Complete project planning sheets
6.5	Sketch designs for projects
6.6	Plan cabinet construction project
6.7	Design and develop project plans
12.2	Use band saw
12.3	Use table (circular) saw
12.4	Use drill press
12.5	Use planer and surfacer
12.6	Use jointer
12.7	Use belt and disc sander
12.8	Use wood lathe
12.9	Use oscillating spindle sander
12.10	Use radial arm saw
12.11	Use shaper
13.4	Use router
13.5	Use portable circular saw
6.6	Plan cabinet construction project
9.4	Describe cabinet construction techniques

*On-going activities

Suggested Task/Competency Sequence

9.2 Select and use fasteners
9.3 Identify adhesive types and uses
11.1 Select and apply wood stains
11.3 Select and apply transparent finishes
14.1 Repair broken furniture
14.2 Refinish furniture
15.4 Participate in group marketing enterprise project
15.5 Plan and participate in competitions

WOODS TECHNOLOGY COURSE OUTLINES

Outline and Code

for

WOODS TECHNOLOGY II

Course Outline	Task/Competency Code
I. Wood Technology and Industry	
A. Wood-related occupations	1.1
B. Management systems	1.2
C. Tool and machine safety	2.1
D. Laboratory safety and management	2.2
E. Industry and community activities	15.1-15.3
II. Design of Wood Products	
A. Project planning process review	6.1-6.4
B. Design and sketching	6.5
C. Cabinet construction planning	6.6
D. Develop project plans	6.7
III. Advanced Machine Processes and Safety	
A. Machine tools review	12.2-12.4
1. Table saw	12.3
2. Band saw	12.2
3. Drill press	12.4
B. Planer and surfacer	12.5
C. Jointer	12.6
D. Belt and disc sander	12.7
E. Wood lathe	12.8
F. Spindle sander	12.9
G. Radial arm saw	12.10
H. Shaper	12.11
I. Router	13.4
J. Portable circular saw	13.5
IV. Cabinet Making	
A. Cabinet making design review	6.6
B. Joinery and construction techniques	9.4
C. Cabinet assembly review	9.2, 9.3
D. Finishing techniques	11.1, 11.3

Course Outline	Task/Competency Code
V. Furniture Reconditioning	
A. Furniture repair	14.1
B. Furniture refinishing	14.2
VI. The Industrial Arts Student Organization	
A. Group marketing enterprise project	15.4
B. Contests, exhibits, and shows	15.5

PART 2

TASK INVENTORY

One of the major characteristics of competency-based education (CBE) is that the course content is based upon actual jobs or tasks performed by persons living and working in the technological world. In Virginia, the Department of Education has established standards for competency-based education. According to these standards, competencies must be role-relevant and based upon appropriate research. This standard states:

> Role-relevant competencies that include standards are identified and stated:
>
> The competencies with standards will be identified through V-TECS, IDECC, and other appropriate research. Advisory committees should be used to review competencies and standards. Competencies in the affective domain will be included. Role-relevant competencies are occupational preparation programs for those that specifically relate to the occupation for which the student is being prepared as well as to the personal needs of the student. Role-relevant competencies are related also to orientation, exploration, or industrial arts experiences which have been identified for students.

Therefore, role-relevant jobs or tasks, called competencies in CBE, must be identified and validated before instructional materials are developed and subsequent instruction can take place.

The task list contained in this instructional guide was based on the following:

1. The Virginia Industrial Arts Education Competency Catalog for Woods Technology
2. The review and selection of appropriate competency-based materials
3. Input from industrial arts teachers and curriculum specialists.

Based upon the information collected and reviewed from the available sources indicated, a task inventory was prepared.

The next major step involved in the development of the task inventory was validation of the task list. Validation is essential if the information collected is to be useful in operating CBE courses and programs. The validation process involved the following:

1. Review by writing-team members to determine completeness of the inventory.
2. Review and validation by state consultants to ensure the role-relevance and completeness of the inventory.
3. Review by local industrial arts teachers to determine the validity of the inventory.
4. Final review and editing by writing-team members, project directors, and state staff.

The task list included in this publication was based on current available resources and validated by teachers, advisory committee members, and persons employed in industrial arts. Regional and local tasks were included in the inventory; therefore, individual tasks may or may not be applicable for a given locality. It is essential that all instruction be based on the validated task analyses included in this resource.

The task list has not been arranged in order of difficulty of tasks or instructional sequence because of the variety of courses and programs offered throughout the state. Sequencing has been shown in the sample course outlines in Part 1 of this package.

TASK INVENTORY
FOR

WOODS TECHNOLOGY

CONTENT/CONCEPT AREAS

1. Exploring Wood Technology and Industries
2. Organizing Safety and Laboratory Management Systems
3. Using Wood Science
4. Using Lumber
5. Using Processed Woods
6. Planning a Project
7. Measuring and Laying Out Work
8. Using Hand Tools
9. Using Fasteners and Cabinet Joints
10. Preparing Surfaces for Finishes
11. Finishing Wood
12. Using Power Tools
13. Using Portable Power Tools
14. Reconditioning Furniture
15. Integrating the Student Organization throughout the Course

CONTENT/CONCEPT

1. EXPLORING WOOD TECHNOLOGY AND INDUSTRIES

TASKS/COMPETENCIES

1.1 Explore woodworking occupations

1.2 Identify (establish) personnel management systems

Application

CONTENT/CONCEPT

1. EXPLORING WOOD TECHNOLOGY AND INDUSTRIES

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

1.1 Explore woodworking occupations

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

1.1

PERFORMANCE OBJECTIVE

P1.1 Given resource materials on woodworking occupations, investigate selected woodworking occupations and report on two or more occupations of interest in accordance with the instructor's guidelines. Report must include probable duration of occupation, wages or salary to be expected, physical requirements, and educational or skill requirements for job entry.

SELECTED ENABLING OBJECTIVES

E1.1.1 Identify and list selected woodworking occupations.

E1.1.2 Demonstrate how to use the Dictionary of Occupational Titles and the Occupational Outlook Handbook. Explain how to determine worker relationship to data, people, and things, using the D.O.T. occupational code.

E1.1.3 List characteristics of the following work modes: mechanical, social, investigative, conventional, creative, and persuasive. Discuss how work modes apply to various woodworking careers or jobs.

E1.1.4 Explain how the apprentice system works in selected woods technology occupations.

E1.1.5 Investigate two or more occupations of interest and report findings.

CRITERION-REFERENCED MEASURE

C1.1 Investigate a number of woodworking occupations and list the following characteristics for two or more in accordance with the instructor's guidelines: probable duration of occupation, wages or salary to be expected, physical requirements, and the educational and skill requirements for job entry.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students list selected woodworking occupations and identify major duties for each occupation (E1.1.1).

2. Demonstrate how to use the Dictionary of Occupational Titles and Occupational Outlook Handbook to locate career and job information. Explain how to determine worker relationships to data, people, and things, using the D.O.T. occupational code. Explain and discuss work modes and how they describe various occupations in woods technology (E1.1.2, E1.1.3).

3. Have students list the qualifications and educational requirements for selected woodworking occupations (E1.1.1).

4. Explain how the apprenticeship program works in various occupations related to woods technology (E1.1.4).

5. Have students give an oral report on their research. The written report can be used to make an outline for the oral report (E1.1.5).

SELECTED TOOLS AND MATERIALS

Paper, pen, and/or typewriter
Other report-writing materials

SELECTED AUDIOVISUAL MATERIALS

Film: Careers in Industry (#79912), Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film: Careers in Building Trades (#80812), Audiovisual Services.
Film: Building a House (#76904), Audiovisual Services.

SELECTED REFERENCES

Constructing and Manufacturing Wood Products. Wayne H. Zook
Dictionary of Occupational Titles. U. S. Department of Labor.
Encyclopedia of Careers and Vocational Guidance, Vols. I and II, Revised.
General Woodworking, 6th ed. Chris H. Groneman.
Manufacturing: A Basic Text for Industrial Arts. James Fales, et al.

Application

CONTENT/CONCEPT

1. EXPLORING WOOD TECHNOLOGY AND INDUSTRIES

TASK/COMPETENCY

1.2 Identify (establish) management systems

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

1.2

PERFORMANCE OBJECTIVE

P1.2 Given a lecture and handouts on management systems used in wood-related industries, identify and establish personnel for at least six positions needed for class and laboratory personnel system according to instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E1.2.1 Describe activities of personnel in wood-related industries.

E1.2.2 List titles of officers in AIASA and other organizations.

E1.2.3 Describe purpose of class/laboratory personnel system.

CRITERION-REFERENCED MEASURE

C1.2 Identify and establish at least six titles of personnel needed for class and laboratory personnel system according to instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Show film or slides which illustrate personnel in wood industry (E1.2.1).
2. Show slide/tape series titled "AIASA--A Classroom Experience" (E1.2.3).
3. Hand out information on duties of organization leaders and industry managers (E1.2.2).
4. Assign readings to help students learn about work people do (E1.2.1).
5. Give quiz matching titles of personnel to activities performed in a personnel system (P1.2).

SELECTED TOOLS AND MATERIALS

None identified

SELECTED AUDIOVISUAL MATERIALS

Slides:	AIASA--A Classroom Experience. National AIASA, 1908 Association Drive, Reston, Virginia 22091.
Film:	Careers in Building Trades (#80812). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film:	Modern Corporation (#47112). Audiovisual Services.
Film:	The Big Corporation (#08413). Audiovisual Services.
Film:	Careers in Industry (#79912). Audiovisual Services.

SELECTED REFERENCES

Constructing and Manufacturing Wood Products. Wayne H. Zook.

Student Association Activities in Industrial Arts Instruction. Industrial Arts Education Service.

CONTENT/CONCEPT

2. ORGANIZING SAFETY AND LABORATORY MANAGEMENT SYSTEMS

TASKS/COMPETENCIES

2.1 Identify safety rules and use laboratory tools and machines safely

2.2 Participate in organized personnel system to manage class and laboratory activities

CONTENT/CONCEPT

2. ORGANIZING SAFETY AND LABORATORY MANAGEMENT SYSTEMS

TASK/COMPETENCY

2.1 Identify safety rules and use laboratory tools and machines safely

Application

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

2.1

PERFORMANCE OBJECTIVE

P2.1 Given woodworking laboratory equipment and the proper safety instructions on each tool and machine, list and explain general laboratory safety rules to the instructor's satisfaction. Use the tools and machines as directed by the instructor, in accordance with OSHA and accepted industrial safety standards.

SELECTED ENABLING OBJECTIVES

E2.1.1 Identify the general safety rules and safety equipment.

E2.1.2 Identify specific safety rules and equipment as they apply to use of each tool or machine.

E2.1.3 Demonstrate the use of safety equipment as it applies to each tool or machine.

E2.1.4 Distinguish among class A, B, and C fire extinguishers and observe or demonstrate their uses.

CRITERION-REFERENCED MEASURE

C2.1 List and explain general laboratory safety rules to the instructor's satisfaction. Demonstrate safe use or operation of selected tools and equipment as directed by instructor, in accordance with OSHA and accepted industrial safety standards.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students read resource materials on safety and identify the general safety rules and safety equipment required for a safe working environment (E2.1.1-E2.1.4).

2. Give demonstration and audiovisual display or present materials on safety rules and equipment as they apply to each tool or machine and to specific tasks (E2.1.2).

3. Make a list of the safety rules that pertain to the laboratory (E2.1.3).

4. Have students practice safety rules in the laboratory each day (E2.1.1-E2.1.4).

5. Form a safety committee to invite speaker on safety from industry (E2.1.1-E2.1.4).

6. Explain how fire extinguishers are color-coded (green, red, blue) and how each type should be used in putting out class A (ordinary combustibles), class B (chemicals), and class C (electrical) fires (E2.1.4).

SELECTED TOOLS AND MATERIALS

Safety posters
Shop tools and equipment

SELECTED AUDIOVISUAL MATERIALS

Film: Introduction to Woodshop/Carpentry Safety (#1B1). Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.
Films: Industrial Arts Skill and Safety Series (as applicable). Abraxas Films.

SELECTED REFERENCES

The Book of Tests: Safety Tests for Woodworking. Abraxas Films.
General Shop Woodworking, 6th ed., Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.

CONTENT/CONCEPT

2. ORGANIZING SAFETY AND LABORATORY MANAGEMENT SYSTEMS

TASK/COMPETENCY

2.2 Participate in organized personnel system to manage class and laboratory activities

Application

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

2.2

PERFORMANCE OBJECTIVE

P2.2 Given the list of in-class officers, committees, and the duties of each, participate in an organized personnel system for the class so that classroom and laboratory activities are managed in accordance with the instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E2.2.1 Discuss the need for people to have organizations.

E2.2.2 List names of organizations in school, community, and industry.

E2.2.3 Describe duties of officers and committees for this class.

E2.2.4 Apply for a position in the personnel system and on a committee such as the "Safety Committee."

E2.2.5 Follow in-class agenda to conduct meetings.

E2.2.6 Manage classroom and laboratory activities with teacher.

CRITERION-REFERENCED MEASURE

C2.2 Participate in the class personnel system as an officer or member or a committee so that classroom and laboratory activities are managed in accordance with the instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Introduce students to the American Industrial Arts Student Association through literature and slides (E2.2.1).

2. Present lesson on organizing personnel systems from AIASA Guide 2 (E2.2.2).

3. Hand out and discuss a listing of the duties of officers and committees in personnel system (E2.2.3, E2.2.4).

4. Show film or filmstrip on meeting procedures (E2.2.5).

5. Explain organizational chart in which each leader and committee are identified (E2.2.3-E2.2.4).

6. Use class safety committee to emphasize safety in the laboratory (E2.2.6).

SELECTED TOOLS AND MATERIALS

Flag and banner
Gavel
Officer symbols on table in front of class area

SELECTED AUDIOVISUAL MATERIALS

Film: How to Conduct a Meeting. Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Slides: Move with Tomorrow. Industrial Arts Education Service, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Slides: Organizing the Industrial Arts Student Association. Industrial Arts Education Service.
TV Tape: In-Class AIASA Management. Industrial Arts Education Service.

SELECTED REFERENCES

Organizing the Industrial Arts Student Association, Guide 1. Virginia Department of Education.
Robert's Rules of Order. Henry M. Roberts.
Student Association Activities in Industrial Arts, Guide 2. Virginia Department of Education.

CONTENT/CONCEPT

3. USING WOOD SCIENCE

TASKS/COMPETENCIES

3.1 Identify wood structure

3.2 Differentiate between hardwoods and softwoods

3.3 Describe tree structure

3.4 Identify wood grains

CONTENT/CONCEPT

3. USING WOOD SCIENCE

TASK/COMPETENCY

3.1 Identify wood structure

Application

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

3.1

PERFORMANCE OBJECTIVE

P3.1 Given resource materials on the nature and structure of wood and a cross-section diagram of log structure, label designated parts of a log. All designated parts, including springwood, summerwood, cells, and fibers, must be identified in accordance with the instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E3.1.1 Identify areas of the United States that produce lumber and list types of trees common to various geographic forest locations.

E3.1.2 Collect an assortment of small limbs or log sections. Use vise and saw to produce cut-away views. Describe characteristics of wood structure, using cut-away view samples.

E3.1.3 Identify parts of various types of logs.

CRITERION-REFERENCED MEASURE

C3.1 Label a cross-section diagram of a log, including springwood, summerwood, cells, and fibers, in accordance with the instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students list the geographic location of forests in the United States and the types of trees common to the listed areas (E3.1.1).
2. Have students bring small sections of limbs or small logs to class. Demonstrate how to produce a cut-away view of wood structure (E3.1.2).
3. Have students make cut-away view of a variety of wood types. Display samples and have students describe wood characteristics (E3.1.3).

SELECTED TOOLS AND MATERIALS

Chart of the structure of a log
Colored pencils
Woodworking vise
Cross-cut saw

SELECTED AUDIOVISUAL MATERIALS

Film:	Industrial Arts--Knowing Your Wood (#33909). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Transparencies:	Wood Technology, DCA Educational Products; available from Graves-Humphreys, Inc., 1948 Franklin Road, Roanoke, Virginia 24033.

SELECTED REFERENCES

Exploring Careers in Industry. Wilbur R. Miller, Marion E. Maddox, and Lavon B. Smith.
General Woodworking, 5th ed., pp. 273-276. Chris H. Groneman.

CONTENT/CONCEPT

3. USING WOOD SCIENCE

TASK/COMPETENCY

3.2 Differentiate between hardwoods and softwoods

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

3.2

PERFORMANCE OBJECTIVE

P3.2 Given wood classification information and samples of hardwoods and softwoods, select and identify hardwoods and softwoods by name, using the woodworker's standard identifying applications and classification processes (open grain and closed grain). All identification must be accurate in accordance with instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E3.2.1 List characteristics of hardwoods and softwoods.

E3.2.2 Distinguish between open grain and closed grain.

E3.2.3 Select and identify by name different hardwoods and softwoods from a mixed selection of samples.

E3.2.4 Collect and label hardwood and softwood samples.

E3.2.5 List and discuss industrial uses of hardwoods (for example, fine furniture).

E3.2.6 List and discuss industrial uses of softwood (for example, construction).

CRITERION-REFERENCED MEASURE

C3.2 Select and identify hardwoods and softwoods by name, using the woodworker's standard identifying applications and classification processes. All identifications must be accurate in accordance with the instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain, demonstrate, and illustrate how to identify and classify softwood and hardwood (E3.2.1, E3.2.2).
2. Display samples and have students select hardwoods by name. Have students collect as many samples as possible and label them (E3.2.3, E3.2.4).
3. Discuss industrial applications of hardwoods and softwoods (E3.2.5, E3.2.6).

SELECTED TOOLS AND MATERIALS

Chart of log structure
Wood samples

SELECTED AUDIOVISUAL MATERIALS

Film:	Industrial Arts--Knowing Your Wood (#33909). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Transparencies:	Wood Technology, DCA Educational Products; available from Graves-Humphreys, Inc., 1948 Franklin Road, Roanoke, Virginia 24033.

SELECTED REFERENCES

General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.
Wood Handbook, Basic Information on Wood. U. S. Department of Agriculture.

CONTENT/CONCEPT

3. USING WOOD SCIENCE

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

3.3 Describe tree structure

COURSE

Woods Technology I (8449)

3.3

PERFORMANCE OBJECTIVE

P3.3 Given a cross-section diagram of a tree trunk, label the heartwood, sapwood, cambium, phloem, and outer bark. All labels must be to the instructor's satisfaction.

SELECTED ENABLING OBJECTIVES

E3.3.1 Define heartwood, sapwood, cambium, phloem, outer bark.

E3.3.2 Explain the structure of a tree.

E3.3.3 Identify parts of a tree trunk, using various wood samples.

CRITERION-REFERENCED MEASURE

C3.3 Illustrate and label a cross-section of a tree trunk. The heartwood, sapwood, cambium, phloem, and outer bark must be identified and labeled to the instructor's satisfaction.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Define and illustrate key terms associated with tree structure (E3.3.1).
2. Give a lecture on tree structure, using audiovisual materials or cut-away section of a tree (E3.3.1-E3.3.3).
3. Have students draw and label a cross-section diagram of a tree trunk (P3.3).

SELECTED TOOLS AND MATERIALS

Paper
Pencil and colored pencils
Cut-away sections of tree trunk
Cross-section diagram of a tree

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Constructing and Manufacturing Wood Products. Wayne H. Zook.
Exploring Careers in Industry. Wilbur R. Miller, Marion E. Maddox, and Lavon B. Smith.
General Woodworking, 5th ed. Chris H. Groneman.

Application

CONTENT/CONCEPT

3. USING WOOD SCIENCE

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

3.4 Identify wood grains

COURSE

Woods Technology I (8449)

3.4

PERFORMANCE OBJECTIVE

P3.4 Given resource materials and quarter-sawed lumber; plain-sawed lumber; and open, semi-open (medium), and closed grain wood samples; identify the grain in the wood samples. All identifications must be accurate in accordance with the instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E3.4.1 Label a diagram of a plain-sawed log.

E3.4.2 Label a diagram of a quarter-sawed log.

E3.4.3 Attempt to split a "green log."

E3.4.4 Describe characteristics of open-grained, medium or semi-open grained, and closed-grained wood.

CRITERION-REFERENCED MEASURE

C3.4 Identify grain by name in quarter-sawed and plain-sawed lumber samples with open, semi-open (medium), and closed grain. All identifications must be accurate in accordance with the instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students draw and label a diagram of a plain-sawed log (E3.4.1).
2. Have students draw and label a diagram of a quarter-sawed log (E3.4.2).
3. Have selected students try splitting a "green log" (E3.4.3).
4. Have students identify samples of wood grain, using an identification check sheet (P3.4).

SELECTED TOOLS AND MATERIALS

Paper and pencil
Small green log
Wedge
Heavy hammer
Plain-sawed lumber
Quarter-sawed lumber

SELECTED AUDIOVISUAL MATERIALS

Transparencies of plain-sawed log, quarter-sawed log

SELECTED REFERENCES

General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.

CONTENT/CONCEPT

4. USING LUMBER

TASKS/COMPETENCIES

4.1 Describe lumber seasoning

4.2 Identify lumber defects and causes

4.3 Compute board feet

CONTENT/CONCEPT

4. USING LUMBER

TASK/COMPETENCY

4.1 Describe lumber seasoning

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

4.1

PERFORMANCE OBJECTIVE

P4.1 Given resource materials, list, identify, and describe industrial methods of seasoning lumber. Description must include type of lumber, drying method, drying time, moisture content, and industrial uses. All lists and identifications must conform to instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E4.1.1 Identify and describe each method of seasoning lumber used in industry. Include steam, air, kiln, and radio-frequency drying methods.

E4.1.2 Identify and explain the types of lumber seasoning used by industry for woods to be used on inside cabinet work and furniture.

E4.1.3 Identify and explain the types of lumber seasoning used by industry in carpentry and construction.

E4.1.4 Examine and identify a variety of wood samples seasoned by various methods.

CRITERION-REFERENCED MEASURE

C4.1 List, identify, and describe industrial methods of seasoning lumber. Description must include type of lumber, drying method, drying time, moisture content, and industrial uses. All lists and identifications must conform to instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students read text assignment and view audiovisuals on lumber seasoning, then make a list of the seasoning methods and explain each type (E4.1.1).

2. List and discuss industrial lumber seasoning methods used on wood to be used for inside cabinet work and furniture (E4.1.2).

3. List and discuss industrial lumber seasoning methods applied to woods for carpentry and construction uses (E4.1.3).

4. Display samples of wood seasoned by a variety of methods (E4.1.1-E4.1.4).

SELECTED TOOLS AND MATERIALS

Paper and pencil

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Hardwood Processing. McGraw Hill Book Company, 110 15th Street, Delmar, California 92014.

SELECTED REFERENCES

General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.

CONTENT/CONCEPT

4. USING LUMBER

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

4.2 Identify lumber defects and causes

COURSE

Woods Technology I (8449)

4.2

PERFORMANCE OBJECTIVE

P4.2 Given instruction, resources, and samples of checks, pecks, shakes, heart pith, knot, decay, stain, pitch pockets, warp, bow and crook, or other lumber defects, identify the defects and list the cause for each defect. Eight out of ten identifications must be correct.

SELECTED ENABLING OBJECTIVES

E4.2.1 List lumber defects and their causes.

E4.2.2 Identify lumber defects from samples.

CRITERION-REFERENCED MEASURE

C4.2 Identify samples of checks, pecks, shakes, heart pith, knot, decay, stain, pitch pockets, warp, bow and crook, or other lumber defects and describe the causes of each defect. Eight out of ten identifications must be correct.

SELECTED INSTRUCTIONAL ACTIVITIES

1. List and discuss lumber defects and their causes (E4.2.1).
2. Display defect samples and/or pictures of lumber defects. Have students identify each type of defect (E4.2.2).

SELECTED TOOLS AND MATERIALS

Paper and pencil
Samples or pictures of wood defects

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Advanced Woodworking and Furniture Making. John L. Feirer and Gilbert Hutchings.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

4. USING LUMBER

TASK/COMPETENCY

4.3 Compute board feet

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

4.3

PERFORMANCE OBJECTIVE

P4.3 Given a bill of materials, four pieces of lumber for a project, measuring tools, and formulas for computing board feet, measure the lumber and calculate board feet for each piece. Calculations must be within ± 2 board feet of instructor's calculations, and results must be recorded on bill of materials in accordance with instructor's directions.

SELECTED ENABLING OBJECTIVES

E4.3.1 Define board feet, square feet, lineal feet, sheet stock, solid lumber, rough size, bill of materials, and finish size.

E4.3.2 Identify and discuss ways lumber is measured and sold.

E4.3.3 Demonstrate how to measure thickness, width, and length of a board and how to assign values for thickness less than 1 inch or more than 1 inch.

E4.3.4 Explain how to use the formula for computing board feet if the length is in feet. Board feet = $\frac{\text{thickness (")} \times \text{width (")} \times \text{length (')}}{12}$

E4.3.5 Explain how to use the formula for computing board feet if all dimensions are in inches. $\frac{\text{Board feet} = \text{thickness (")} \times \text{width (")} \times \text{length (")}}{144}$

E4.3.6 Examine a sample bill of materials and practice using provided information to calculate board feet.

E4.3.7 Practice using each method of calculating board feet.

CRITERION-REFERENCED MEASURE

C4.3 Measure four pieces of lumber for a project and calculate board feet for each piece of lumber. Calculations must be within ± 2 board feet of instructor's calculations, and results must be recorded on a bill of materials in accordance with instructor's directions.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Define and discuss key terms associated with board feet and other lumber measurements (E4.3.1, E4.3.2).

2. Demonstrate how to measure lumber and how to assign values for thicknesses less than one inch or more than one inch thick (E4.3.3).

3. Define and discuss key terms associated with board foot measurement and write down the formula in inches and feet. Demonstrate and have students practice each method (E4.3.4, E4.3.5, E4.3.7).

4. Discuss a bill of materials and distribute a sample (E4.3.6).

5. Give students a bill of materials and have them calculate the board feet for a project (E4.3.6).

6. Have students compute board feet after taking measurements from pieces of lumber (P4.3).

SELECTED TOOLS AND MATERIALS

Paper and pencil
Pieces of cut lumber
Chart explaining board foot measurement
Measuring tools
Sample bill of materials

SELECTED AUDIOVISUAL MATERIALS

Transparency of bill of materials

SELECTED REFERENCES

General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

5. USING PROCESSED WOODS

TASKS/COMPETENCIES

5.1 Describe the characteristics of plywoods and veneers

5.2 Describe the characteristics of hardboard, fiberboard, and laminates

CONTENT/CONCEPT

5. USING PROCESSED WOODS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

5.1 Describe characteristics of plywoods and veneers

COURSE

Woods Technology I (8449)

5.1

PERFORMANCE OBJECTIVE

P5.1 Given resource materials and a sample of plywood, describe the veneer and core characteristics, classify the plywood, and list at least five uses for plywood. Answers must be in accordance with instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E5.1.1 Define veneer, ply, dimensionally stable, core, crossbands, face veneer, and premium.

E5.1.2 Identify types of slicing machines and explain how plywood is processed.

E5.1.3 Draw a diagram showing the face veneer, crossband, lumber core, and back veneer of a sheet of processed plywood and veneer.

E5.1.4 Identify the types of cores used in plywood, softwood, and hardwood.

E5.1.5 Explain how plywoods are graded and classified.

E5.1.6 List and discuss the uses of plywood and veneers.

CRITERION-REFERENCED MEASURE

C5.1 Describe plywood veneer and core characteristics, classify a plywood sample, and list at least five uses for plywood, according to instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Define and discuss key terms and concepts related to plywood structure, processing, and use (E5.1.1).
2. Explain and discuss plywood-making processes (E5.1.2).
3. Have students draw and label a diagram of a crossbanded sheet of veneer with a lumber core center (E5.1.3, E5.1.4).
4. Display hardwood and softwood plywood samples and give a lecture and demonstration on plywood classification and grading. Have students list the classifications of plywood (E5.1.5).
5. Give lecture and demonstration on uses of plywood and veneers. Have students list the uses of plywood and veneers (E5.1.6).

SELECTED TOOLS AND MATERIALS

Paper and colored pencils
Samples of hardwood and softwood plywood and veneer
Slicing machines or illustrations of same

SELECTED AUDIOVISUAL MATERIALS

Film:	Industrial Arts--Knowing Your Wood (#33909). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Transparencies:	Wood Technology, DCA Educational Products; available from Graves-Humphreys, Inc., 1948 Franklin Road, Roanoke, Virginia 24033.

SELECTED REFERENCES

General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

5. USING PROCESSED WOODS

TASK/COMPETENCY

5.2 Describe characteristics of hardboard, fiberboard, and laminates

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

5.2

PERFORMANCE OBJECTIVE

P5.2 Given resource materials, samples of hardboard, fiberboard, and laminates, and a recording form, describe the construction, size, availability, and uses of each. All spaces on the form must be completed to the instructor's satisfaction.

SELECTED ENABLING OBJECTIVES

E5.2.1 Define hardboard, fiberboard, untempered, tempered, laminates.

E5.2.2 List the sources of raw materials for hardboard, fiberboard, and laminates.

E5.2.3 Describe the manufacturing processes for production of hardboard, fiberboard, and laminates.

E5.2.4 List the advantages of hardboard, fiberboard, and laminates.

E5.2.5 List the uses of hardboard, fiberboard, and laminates.

CRITERION-REFERENCED MEASURE

C5.2 Describe in writing the construction, size, availability, and uses of given samples of hardboard, fiberboard, and laminates, using provided form. All spaces on the form must be completed to the instructor's satisfaction.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display samples of hardboard, fiberboard, and laminates and explain difference between tempered and untempered grades (E5.2.1).

2. List sources of raw material for hardboard, fiberboard, and laminates and describe the manufacturing process (E5.2.2, E5.2.3).

3. Have students draw a flow chart or diagram of the hardboard, fiberboard, and laminates manufacturing process (E5.2.3).

4. List and discuss advantages and disadvantages of hardboard, fiberboard, and laminates (E5.2.4).

5. Discuss uses and guidelines for selection of hardboard, fiberboard, and laminates (E5.2.5).

SELECTED TOOLS AND MATERIALS

Paper and pencil
Recording forms
Samples of hardboard, fiberboard, and laminates
Chart of log structure
Wood samples

SELECTED AUDIOVISUAL MATERIALS

Film:	Industrial Arts--Knowing Your Wood (#33909). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Transparencies:	Wood Technology. DCA Educational Products; available from Graves-Humphreys, Inc., 1948 Franklin Road, Roanoke, Virginia 24033.

SELECTED REFERENCES

Exploring Careers in Industry. Wilbur R. Miller, Marion E. Maddox, and Lavon B. Smith.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

6. PLANNING A PROJECT

TASKS/COMPETENCIES

6.1 Select project and list steps for making project

6.2 Make drawings

6.3 Fill out bill of materials

6.4 Complete project planning sheet

6.5 Sketch designs for projects

6.6 Plan cabinet construction project

6.7 Design and develop project plans

Application

CONTENT/CONCEPT

6. PLANNING A PROJECT

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

6.1 Select project and list steps for making the project

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

6.1

PERFORMANCE OBJECTIVE

P6.1 Given resource material, a budget, and a time limit, select a woodworking project and list the required steps for planning and making the project. Project selected must be appropriate according to time, cost, material and tool availability, and skill level of the student as judged by the instructor.

SELECTED ENABLING OBJECTIVES

E6.1.1 Examine an assortment of completed woodworking projects. Estimate cost of project, identify tools and materials used, and estimate amount of time used to complete each project. Identify woodworking skills required to produce each project.

E6.1.2 Assess personal time, budget, interests, skill levels, and other factors to consider when selecting a woodworking project.

E6.1.3 Explain the following steps used in project planning: (a) sketches, (b) drawings, (c) bill of materials, (d) procedure, (e) required tools and materials, (f) cost estimates, (g) time estimate, and (h) other information required by instructor.

CRITERION-REFERENCED MEASURE

C6.1 Select a woodworking project and list the required steps for planning and making the project. Project selected must be appropriate according to time, cost, material and tool availability, and skill level of the student as judged by the instructor.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display an assortment of completed woodworking projects reflecting a variety of skill levels. Discuss time, cost, materials, tool availability, student skills, and other factors to consider when selecting a project (E6.1.1, E6.1.2).

2. Outline and discuss steps for planning a project. Have students select a project. Assist in the decision-making process if necessary and approve all projects (E6.1.3).

SELECTED TOOLS AND MATERIALS

Sample planning sheets
Sample bill of materials
Assortment of completed projects

SELECTED AUDIOVISUAL MATERIALS

Transparencies: Bill of materials and planning sheet.
Filmstrip: Design in Wood. McGraw-Hill Book Company, 110 15th Street, Delmar, California 92014.
Filmstrip: Advanced Woodworking: Material Selection. R.M.I. Film Production--Coleman Film Enterprises, 701 Westport Road, Kansas City, Missouri 64411.
Filmstrip: Advanced Woodworking: Project Planning. R.M.I. Film Production.
Filmstrip: Advanced Woodworking: Final Parts Shaping. R.M.I. Film Production.
Filmstrip: Designs in Wood. Popular Science; distributed by Denoyer-Geppert Audio-Visual, Times Mirror, 5235 Ravenswood Avenue, Chicago, Illinois 60640.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
Exploring Careers in Industry, pp. 12-19. Wilbur R. Miller, Marion E. Maddox, and Lavon B. Smith.
Projects in Wood Furniture. J. H. Douglass.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

6. PLANNING A PROJECT

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

6.2 Make drawings

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

6.2

PERFORMANCE OBJECTIVE

P6.2 Given a specific woodworking project, resources, and drawing equipment, sketch the final project design and make multiview and pictorial working drawings for the project. Working drawings must be drawn to scale, all lines must be clean and clear, and all drawings must be accurate in accordance with instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E6.2.1 Define working drawings, multiview drawings, pictorial drawings, scales, object lines, hidden lines, center lines, extension lines, dimension lines, and grid.

E6.2.2 Examine samples of working drawings and describe and discuss their characteristics and uses.

E6.2.3 Demonstrate how to draw to scale. Practice increasing and decreasing dimensions.

E6.2.4 Practice making pictorial drawings for selected projects. Use a grid for irregular designs and curves.

E6.2.5' Practice making multiview drawings for selected projects. Label the object, hidden, center, extension, and dimension lines.

CRITERION-REFERENCED MEASURE

C6.2 Sketch a final project design and make multiview and pictorial working drawings for the project. Working drawings must be drawn to scale, all lines must be clean and clear, and all drawings must be accurate in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Define and discuss key terms and concepts related to working drawings (E6.2.1).

2. Display samples of working drawings. Discuss uses of pictorial and multiview drawings and demonstrate how to interpret the drawings (E6.2.2).

3. Demonstrate and have students practice drawing techniques and drawing to scale (E6.2.3).

4. Supervise student practice in making pictorial drawings (E6.2.4).

5. Demonstrate how to draw object, hidden, center, extension, and dimension lines on multiview drawings. Supervise student practice in making multiview drawings (E6.2.5).

SELECTED TOOLS AND MATERIALS

Sample pictorial drawings
Sample multiview drawings
Drawing kit

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Advanced Woodworking: Project Planning. R.M.I. Film Production--Coleman Film Enterprises, 701 Westport Road, Kansas City, Missouri 64411.

SELECTED REFERENCES

Working With Wood, pp. 12-16. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

6. PLANNING A PROJECT

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

6.3 Fill out bill of materials

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

6.3

PERFORMANCE OBJECTIVE

P6.3 Given working drawings for a project, a bill of materials, and information concerning materials cost, fill out the bill of materials for the project. All calculations must be accurate and all entries complete, in accordance with instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E6.3.1 Define finish size, rough size, board feet, square feet, unit cost, and total cost.

E6.3.2 Identify and use guidelines for determining rough sizes for stock.

E6.3.3 Examine samples of completed bills of materials. Determine the types of information required.

E6.3.4 Demonstrate how to use a working drawing as a guide in filling out a bill of materials.

E6.3.5 Identify sources of cost information and demonstrate how to calculate unit and total costs.

E6.3.6 Practice filling out bills of materials for selected woodworking projects.

CRITERION-REFERENCED MEASURE

C6.3 Fill out a bill of materials for a selected woodworking project. All calculations must be accurate and all entries complete, in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss key terms and concepts associated with the preparation and use of bill of materials (E6.3.1).
2. Demonstrate how to determine rough sizes for stock (E6.3.2).
3. Display sample bills of materials and identify and discuss types of information included in the forms (E6.3.3).
4. Demonstrate how to fill out a bill of materials, using a working drawing as a guide (E6.3.4).
5. Discuss ways to determine costs of material. Demonstrate how to calculate unit and total costs (E6.3.5).
6. Supervise student practice in filling out bills of materials (E6.3.6).

SELECTED TOOLS AND MATERIALS

Working drawings
Cost information
Bills of materials

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Advanced Woodworking: Material Selection. R.M.I. Film Production--Coleman Film Enterprises, 701 Westport Road, Kansas City, Missouri 64411.
Filmstrip: Advanced Woodworking: Project Planning. R.M.I. Film Production.
Film: Computing a Bill of Materials. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.

SELECTED REFERENCES

Working With Wood, pp. 12-16. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

6. PLANNING A PROJECT

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

6.4 Complete project planning sheet

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

6.4

PERFORMANCE OBJECTIVE

P6.4 Given resource materials, a planning sheet, and a woodworking project, complete the project planning sheet in accordance with instructor's directions. The plan sheet must include working drawings, a bill of materials, tools needed, time schedule, and a step-by-step procedure on how to complete the project. All recorded information must be complete and accurate.

SELECTED ENABLING OBJECTIVES

E6.4.1 Identify and explain the purpose of each part of the planning sheet.

E6.4.2 Make working drawings and a bill of materials for a selected project (P6.2, P6.3).

E6.4.3 Identify tools and equipment needed for selected woodworking projects.

E6.4.4 Fill out project planning sheets for selected projects.

CRITERION-REFERENCED MEASURE

C6.4 Complete a written plan for a project. Project plan must include sketches, drawings, bill of materials, step-by-step procedures, a list of needed tools, time schedule, or other information required by the instructor. All recorded information must be complete and accurate.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display sample project planning sheets. Identify and explain the purpose of each part of the form (E6.4.1).
2. Have students make working drawings and fill out a bill of materials for selected woodworking projects (E6.4.2).
3. Help students identify tools and equipment needed for individual projects (E6.4.3).
4. Demonstrate how to fill out project planning sheet (E6.4.4).

SELECTED TOOLS AND MATERIALS

Planning sheets
Bills of materials
Drawing kit

SELECTED AUDIOVISUAL MATERIALS

Transparencies: Bill of materials and planning sheet.
Filmstrip: Design in Wood. McGraw-Hill Book Company, 110 15th Street, Delmar, California 92014.
Filmstrip: Advanced Woodworking: Material Selection. R.M.I. Film Production--Coleman Film Enterprises, 701 Westport Road, Kansas City, Missouri 64411.
Filmstrip: Advanced Woodworking: Project Planning. R.M.I. Film Production.
Filmstrip: Advanced Woodworking: Final Parts Shaping. R.M.I. Film Production.
Filmstrip: Designs in Wood. Popular Science; distributed by Denoyer-Geppert Audio-Visual, Times Mirror, 5235 Ravenswood Avenue, Chicago, Illinois 60640.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood, pp. 12-16. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

6. PLANNING A PROJECT

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

6.5 Sketch designs for projects

COURSE

Woods Technology II (8452)

6.5

PERFORMANCE OBJECTIVE

P6.5 Given pencil and sketch pad, sketch the designs for a selected project in accordance with the instructor's directions.

SELECTED ENABLING OBJECTIVES

E6.5.1 Define type, shape, size, mass, color, tone, texture, proportion, balance, harmony, rhythm, and symmetry.

E6.5.2 Identify some examples of project resources.

E6.5.3 Define the use of the following words: sketch, scale, and mock-up.

E6.5.4 Identify the function of a mock-up.

E6.5.5 Practice sketching designs for woodworking projects.

CRITERION-REFERENCED MEASURE

C6.5 Sketch a design for a project in accordance with instructor's directions.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Define, discuss, or illustrate key terms and concepts related to the elements and principles of design (E6.5.1).
2. Have students make a list of project resources (E6.5.2).
3. Have students practice sketching a project, using the principles of design (E6.5.3, E6.5.4).
4. Have students identify a scale and a mock-up (E6.5.3, E6.5.4).

SELECTED TOOLS AND MATERIALS

Sketch pad and pencil
Scale
Ruler

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Advanced Woodworking: Project Planning. R.M.I. Film Productions--Coleman Film Enterprises, 701 Westport Road, Kansas City, Missouri 64411.

SELECTED REFERENCES

Basic Woodworking. John L. Feirer.
Manufacturing: A Basic Text for Industrial Arts. James Fales, et al.

Application

CONTENT/CONCEPT

6. PLANNING A PROJECT

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

6.6 Plan cabinet construction project

COURSE

Woods Technology II (8452)

6.6

PERFORMANCE OBJECTIVE

P6.6 Given the proper resource materials on cabinet construction, identify the various processes involved in cabinet construction in accordance with the instructor's directions. Processes must include case construction, leg and rail construction, and drawer and door construction.

SELECTED ENABLING OBJECTIVES

E6.6.1 Define cabinet making, butt hinge, door catch, drawer guide, drop-leaf table, and flush drawer.

E6.6.2 Identify the different styles of hinged doors: frame, panel, and solid.

E6.6.3 Identify the five parts of a drawer: front, two sides, back, and bottom.

E6.6.4 Identify the two styles of drawers: flush and lip.

CRITERION-REFERENCED MEASURE

C6.6 Describe the processes in a cabinet construction project, including case construction, leg and rail construction, and drawer and door construction, in accordance with instructor's directions.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students define key terms and concepts related to cabinet construction (E6.6.1).
2. Have students list the five parts of a drawer (E6.6.3).
3. Have students identify the functions of drawer guides (E6.6.1).
4. Have students list the different types of fasteners (E6.6.1).

SELECTED TOOLS AND MATERIALS

Paper and pencil
Ruler

SELECTED AUDIOVISUAL MATERIALS

Film: Sam Moloof--Woodworker (#48808). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.

Transparencies: Basic Construction Details. DCA Educational Products; available from Progressive School Products, 2856 Lamb Place, Memphis, Tennessee 38118.

SELECTED REFERENCES

Exploring Woodworking. Fred W. Zimmerman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

6. PLANNING A PROJECT

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

6.7 Design and develop project plans

COURSE

Woods Technology II (8452)

6.7

PERFORMANCE OBJECTIVE

P6.7 Given proper resource materials on project design, design and develop project plans in accordance with the instructor's directions. Project selection, sketch, working drawings, bill of materials, and plan of procedure must be included.

SELECTED ENABLING OBJECTIVES

E6.7.1 Define sketch, scale, multiview drawing, pictorial drawing, object line, hidden lines, center lines, extension lines, dimension lines, finish size, rough size, and board feet (P6.2).

E6.7.2 Identify design considerations: (a) function, (b) appearance, and (c) selection of materials.

E6.7.3 Identify design procedure: (a) stating the problem, (b) making sketches, and (c) preparing mock-up.

E6.7.4 List three parts of a project plan.

E6.7.5 List types of information on a bill of material (P6.3).

E6.7.6 Make a working drawing for a project (P6.2).

E6.7.7 Fill out a bill of materials (P6.3).

E6.7.8 Make a plan of procedure.

CRITERION-REFERENCED MEASURE

C6.7 Design and develop project plan in accordance with instructor's directions. Project selection and a sketch of project must be included as well as working drawings, bill of materials, and a plan of procedure.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students define and discuss key terms and concepts related to project planning (E6.7.1).
2. Discuss design considerations and procedures (E6.7.2, E6.7.3).
3. Have students review parts of a project plan (E6.7.4).
4. Have students list types of information on a bill of materials (E6.7.5).
5. Have students make a working drawing for a project. Included must be size, shape, and parts (E6.7.6).
6. Have students make a plan of procedure and fill out a bill of materials for a designated project (E6.7.7, E6.7.8).
7. Assist students individually or in small groups with designing and developing project plans (P6.7).

SELECTED TOOLS AND MATERIALS

Paper and pencil
Drawing kit

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Exploring Woodworking. Fred W. Zimmerman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

7. MEASURING AND LAYING OUT WORK

TASKS/COMPETENCIES

7.1 Identify measuring and layout tools and terms

7.2 Measure and layout work using English and metric systems

Application

CONTENT/CONCEPT

7. MEASURING AND LAYING OUT WORK

TASK/COMPETENCY

7.1 Identify measuring and layout tools and terms

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

7.1

PERFORMANCE OBJECTIVE

P7.1 Given resources, a selection of measuring and layout tools (both English and metric), and a list of measuring terms, identify and/or define the tools and terms to the instructor's satisfaction.

SELECTED ENABLING OBJECTIVES

E7.1.1 Explain how length, weight, volume, area, temperature, and speed are measured in metric units and English (customary) units.

E7.1.2 Read and interpret a metric-English conversion chart and demonstrate how to convert English units to and from metric measures.

E7.1.3 Define centi, English (customary) system, decimal system, gram, kilo, meter, metric system, and milli.

E7.1.4 Describe the uses of the following: bench rule, zigzag rule, tape measure, try square, steel square, sliding T-bevel, framing square, combination square, marking pencil, scratch awls, Sloyd and utility knives, marking gauges, chalk lines, plumb bob, dividers, Trammel points, and templates.

CRITERION-REFERENCED MEASURE

C7.1 Identify designated measuring and layout tools and terms to instructor's satisfaction.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain and discuss the English (customary) and metric measurement systems (E7.1.1).
2. Display a metric-English conversion chart and demonstrate how to convert selected measurements (E7.1.2).
3. Define and discuss key terms and concepts associated with laying out and measuring work (E7.1.3).
4. Display layout and measurements tools. Discuss uses for each tool or piece of equipment (E7.1.4).

SELECTED TOOLS AND MATERIALS

Bench rule
Zigzag rule
Tape measure
Try square
Steel square
Sliding T-bevel
Framing square
Combination square
Marking pencil
Scratch awl
Sloyd and utility knives
Marking gauges
Chalk line reel
Plumb bob
Dividers
Trammel points
Templates
Metric-English conversion chart

SELECTED AUDIOVISUAL MATERIALS

Film: Working With Scales (#49709). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film: Learning About Metric Measures (#68709). Audiovisual Services.
Film: Let Us Measure - Using Standard Units (#16204). Audiovisual Services.
Film: What Is Measurement (#15506). Audiovisual Services.
Videotape: Measure Metric -2- Measure Length (#22890). Audiovisual Services.
Film: Measuring and Layout Tools. Sterling Educational Films, 241 East 34th Street, New York, New York 10016.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
Exploring Careers in Industry. Wilbur R. Miller, Marion E. Maddox, and Lavon B. Smith.
General Woodworking, 5th ed. Chris H. Groneman.
Using Metrics in Industrial Arts. Allen E. Bame.

Application

CONTENT/CONCEPT

7. MEASURING AND LAYING OUT WORK

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

7.2 Measure and lay out work, using English and metric systems

COURSE

Woods Technology I (8449)

7.2

PERFORMANCE OBJECTIVE

P7.2 Given measuring and layout instructions, resource materials, English and metric measuring or layout tools, and different sizes of wood stock, measure and mark the stock, using both English and metric systems as directed by the instructor. All markings and recorded measurements must be accurate.

SELECTED ENABLING OBJECTIVES

E7.2.1 Identify measuring and layout tools (P7.1). List uses for each tool.

E7.2.2 Demonstrate how to take measurements, using the English and metric systems.

E7.2.3 Discuss factors to consider when laying out work.

E7.2.4 Practice measuring and laying out work.

CRITERION-REFERENCED MEASURE

C7.2 Measure and mark designated pieces of stock, using both English and metric systems. All work must be performed in accordance with instructor's directions, and all markings and recorded measurements must be accurate.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display measuring and layout tools and explain the purpose and use of each tool (E7.2.1).
2. Demonstrate and have students take measurements using English and metric tools (E7.2.2).
3. Discuss factors to consider when laying out work. Demonstrate special layout techniques (E7.2.3).
4. Supervise student practice in using measuring and layout tools (E7.2.4).

SELECTED TOOLS AND MATERIALS

Layout and measuring tools (See 7.1)
Wood stock
Metric-English conversion chart
Measuring and layout instructions

SELECTED AUDIOVISUAL MATERIALS

Film: Working With Scales (#49709). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film: Learning About Metric Measures (#68709). Audiovisual Services.
Film: Let Us Measure - Using Standard Units (#16204). Audiovisual Services.
Film: What Is Measurement (#15506). Audiovisual Services.
Videotape: Measure Metric -2- Measure Length (#22890). Audiovisual Services.
Film: Measuring and Layout Tools. Sterling Educational Films, 241 East 34th Street, New York, New York 10016.
Film: Tools for Measuring Wood. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
Exploring Careers in Industry. Wilbur R. Miller, Marion E. Maddox, and Lavon B. Smith.
General Woodworking, 5th ed. Chris H. Groneman.
Using Metrics in Industrial Arts. Allen E. Bame.

CONTENT/CONCEPT

8. USING HAND TOOLS

TASKS/COMPETENCIES

8.1 Use hand saws

8.2 Use hand planes

8.3 Use chisels, gouges, and carving tools

8.4 Use surform tools and wood files

8.5 Use hand scrapers and cabinet scrapers

8.6 Use hand boring tools and drilling tools

CONTENT/CONCEPT

8. USING HAND TOOLS

TASK/COMPETENCY

8.1 Use hand saws

Application

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

8.1

PERFORMANCE OBJECTIVE

P8.1 Given instructor's directions, pieces of lumber, a cross-cut saw, rip saw, coping saw, compass saw, keyhole saw, back saw, dovetail saw, and a miter box, cut the pieces of lumber in accordance with instructor's directions. Each tool must be used safely and correctly, and all cuts must be within 1/8 inch outside the layout line.

SELECTED ENABLING OBJECTIVES

E8.1.1 Define points, teeth, set, kerf, waste side, spine, depth gauge, miter box, and tolerance.

E8.1.2 List safety precautions to follow when using hand saws.

E8.1.3 Identify the following tools by name and function performed: cross-cut saw, rip saw, coping saw, compass saw, keyhole saw, back saw, dovetail saw, and miter box.

E8.1.4 Practice safe and correct use of any of the following: cross-cut saw, rip saw, coping saw, compass saw, keyhole saw, back saw, or dovetail saw and miter box.

CRITERION-REFERENCED MEASURE

C8.1 Cut designated pieces of lumber, using a cross-cut saw, rip saw, coping saw, compass saw, keyhole saw, back saw, dovetail saw, and a miter box in accordance with instructor's directions. Each tool must be used safely and correctly, and all cuts must be within 1/8 inch outside the layout line.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Define key terms and concepts associated with use of hand saws (E8.1.1).

2. Discuss and demonstrate safety precautions to follow when using hand saws (E8.1.2).

3. Display different types of hand saws. Identify each by name and discuss functions performed by each saw (E8.1.3).

4. Demonstrate safe and correct use of each saw (E8.1.4).

5. Have students demonstrate the correct and safe use of hand saws. Tolerances for rough work should be 1/8 inch and for finished work 1/16 inch (P8.1).

SELECTED TOOLS AND MATERIALS

Cross-cut saw
Rip saw
Coping saw
Compass and/or keyhole saw
Back and/or dovetail saw
Miter box
Layout tools
Lumber and hardware for predetermined job or individual project

SELECTED AUDIOVISUAL MATERIALS

Film:	ABCs of Hand Tools I & II (#20810 & 20910). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film:	Industrial Arts--Hand Saws (#61104). Audiovisual Services.
Film:	Hand Tools: Cutting Tools. Universal Education and Visual Arts, 1000 Universal City Plaza, Universal City, California 91608.
Filmstrip:	Hand Tool Safety. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.
AV Kit:	Basic Tools for Woodworking. Society for Visual Education, Division of Singer Corporation, 1345 West Diversey Parkway, Chicago, Illinois 60614.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed., pp. 52-63. Chris H. Groneman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

8. USING HAND TOOLS

TASK/COMPETENCY

8.2 Use hand planes

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

8.2

PERFORMANCE OBJECTIVE

P8.2 Given pieces of lumber in need of planing, instructor's directions, and a block plane, jack plane, fore plane, and spoke shave, plane the lumber in accordance with instructor's directions. Tool(s) selected must be appropriate for the project, all tools must be used correctly and safely, and work must be completed within the tolerance set by the instructor.

SELECTED ENABLING OBJECTIVES

E8.2.1 Identify the following planes and the function of each: block plane, jack plane, fore plane, and spoke shave.

E8.2.2 Identify the parts of a plane and demonstrate how to assemble, adjust, and sharpen a plane iron.

E8.2.3 Outline, explain, and demonstrate general planing techniques.

E8.2.4 Practice the safe and correct use of any of the following: block plane, jack plane, fore plane, or spoke shave.

CRITERION-REFERENCED MEASURE

C8.2 Plane designated pieces of lumber, using a block plane, jack plane, fore plane, and/or spoke shave. Tool(s) selected for each project must be appropriate, all tools must be used correctly and safely, and work must be completed within tolerance set by the instructor.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display block plane, jack plane, fore plane, and spoke shave. Discuss uses for each plane (E8.2.1).

2. Identify and discuss parts of a plane and demonstrate how to sharpen, adjust, and assemble a plane iron (E8.2.2).

3. Demonstrate and explain general planing techniques (E8.2.3, E8.2.4).

4. Demonstrate and have students practice the safe and correct use of each type of plane (P8.2).

SELECTED TOOLS AND MATERIALS

Block plane
Jack plane
Fore plane
Spoke shave
Grinder attachment
Sharpening stones
Lumber for predetermined job or individual project

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Hand Tool Safety. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.

Film: Planes (#10109). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.

Film: Planing and Chiseling Tools. U. S. Army. National Audio Center, Washington, DC 20409. Also available in videocassette.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

8. USING HAND TOOLS

TASK/COMPETENCY

8.3 Using chisels, gouges, and carving tools

Application

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

8.3

PERFORMANCE OBJECTIVE

P8.3 Given wood, instructions, chisels, gouges, and a set of carving tools, shape and carve a piece of wood to a predetermined design. All tools must be used safely and correctly in accordance with guidelines provided by the instructor.

SELECTED ENABLING OBJECTIVES

E8.3.1 Examine and identify types and sizes of chisels. Identify uses.

E8.3.2 Examine and identify types of gouges. Identify uses.

E8.3.3 Identify ways to maintain and store chisels and gouges.

E8.3.4 Demonstrate how to sharpen chisels, gouges, and other cutting tools safely and correctly.

CRITERION-REFERENCED MEASURE

C8.3 Shape and carve a piece of wood to a predetermined design, using chisels, gouges, or other carving tools. All tools must be used safely and correctly in accordance with guidelines provided by the instructor.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display and identify types and sizes of chisels. Discuss uses (E8.3.1).
2. Display and identify types of gouges. Discuss uses (E8.3.2).
3. Demonstrate and discuss ways to maintain and store cutting tools (E8.3.3).
4. Demonstrate and have students practice how to sharpen and use chisels, gouges, and other cutting tools (E8.3.4).
5. Provide students with predetermined project. SUGGESTION: Each student can carve a monogram using his or her initials. Initials should be raised above a background, or plaque can be of the student's design (E8.3.1-E8.3.4).

SELECTED TOOLS AND MATERIALS

Chisels, gouges, and carving set
Sharpening stones
Lumber for predetermined job or individual project
Finishing materials

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Hand Tool Safety. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.
Film: Chisels (#10110). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Filmstrip: Planing and Chiseling Tools. U. S. Army, National Audio Visual Center, Washington, DC 20409. Also available in videocassette.

SELECTED REFERENCES

Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

8. USING HAND TOOLS

TASK/COMPETENCY

8.4 Use surform tools and wood files

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

8.4

PERFORMANCE OBJECTIVE

P8.4 Given resource materials, scrap stock or a predetermined job, and an assortment of surform tools and wood files, select and use the tools safely and correctly in accordance with instructor's guidelines. The shape and surface of the wood product must be ready for sanding with abrasive papers.

SELECTED ENABLING OBJECTIVES

E8.4.1 Examine and identify types of surform tools. Discuss uses.

E8.4.2 Examine and identify types of files and rasps. Discuss uses.

E8.4.3 Discuss care and maintenance of files, rasps, and surform tools.

E8.4.4 Select files, rasps, and surform tools for a variety of woodworking purposes.

CRITERION-REFERENCED MEASURE

C8.4 Select and use surform tools and wood files for designated purposes in accordance with instructor's guidelines. All tools must be used safely and correctly, and the shape and surface of the wood product must be ready for sanding with abrasive papers.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display and identify types of surform tools. Discuss uses (E8.4.1).
2. Display and identify types of files and rasps. Discuss uses and explain difference between a rasp and a file (E8.4.2).
3. Demonstrate and discuss care and maintenance of files, rasps, and surform tools (E8.4.3).
4. Demonstrate and have students practice the safe and correct use of files, rasps, and surform tools. Have students practice selecting the appropriate tool for designated woodworking purposes (E8.4.4, P8.4).

SELECTED TOOLS AND MATERIALS

Surform tools
Wood files
Rasps
Scrap wood stock
Job specifications

SELECTED AUDIOVISUAL MATERIALS

Film: Industrial Arts--Knowing Your Wood (#33909). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.

Transparencies: Wood Technology, DCA Educational Products; available from Graves-Humphreys, Inc., 1948 Franklin Road, Roanoke, Virginia 24033.

Transparencies: Woodworking Hand Tools: Forming Tools and Files, DCA Educational Products.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
General Woodworking, 5th ed. Chris H. Groneman.

Application

CONTENT/CONCEPT

8. USING HAND TOOLS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

8.5 Use hand scrapers and cabinet scrapers

COURSE

Woods Technology I (8449)

8.5

PERFORMANCE OBJECTIVE

P8.5 Given lumber containing irregularities or blemishes, safety glasses, a hand scraper, a cabinet scraper, and other necessary tools or equipment, safely remove irregularities and blemishes from the lumber. All machine marks on the lumber should be removed, and the lumber surface should be smooth and ready for sanding with abrasive papers.

SELECTED ENABLING OBJECTIVES

E8.5.1 Examine and identify types of scrapers and list woodworking situations that require the use of a scraper.

E8.5.2 Assemble and adjust a cabinet scraper.

E8.5.3 Sharpen a scraper.

E8.5.4 Demonstrate how to use hand scrapers and cabinet scrapers to remove mill marks.

CRITERION-REFERENCED MEASURE

C8.5 Use hand scrapers and cabinet scrapers to remove irregularities and blemishes from lumber. All tools must be used safely, all machine marks should be removed from the lumber, and the lumber surface should be smooth and ready for sanding with abrasive papers.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display and identify types of scrapers. Discuss uses (E8.5.1).
2. Display samples of wood surfaces that contain burly and knotty lumber or irregularities and blemishes left by other cutting tools (E8.5.1).
3. Demonstrate and have students assemble and adjust a cabinet scraper (E8.5.2).
4. Demonstrate and have students sharpen a scraper (E8.5.3).
5. Demonstrate how to use hand scrapers and cabinet scrapers to remove mill marks and other lumber imperfections. Have students practice, using a variety of tools and lumber samples (E8.5.4, P8.5).

SELECTED TOOLS AND MATERIALS

Hand scraper
Cabinet scraper
File
Oilstone
Burnishing tool
Lumber

SELECTED AUDIOVISUAL MATERIALS

Transparencies: Woodworking Hand Tools: Scraping Tools. DCA Educational Products; available from Graves-Humphreys, Inc., 1948 Franklin Road, Roanoke, Virginia 24033.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, *et al*.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

8. USING HAND TOOLS

TASK/COMPETENCY

8.6 Use hand boring tools and drilling tools

——— Application ———

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

8.6

PERFORMANCE OBJECTIVE

P8.6 Given instructor's specifications, scrap stock, safety glasses, a brace and bits, hand drill, and other hand boring or drilling tools, drill or bore holes in accordance with instructor's specifications. All tools must be used safely and correctly.

SELECTED ENABLING OBJECTIVES

E8.6.1 Define pinion, chuck, drilling, boring, dowel, brace, ratchet mechanism, twist drill, blind hole, and depth gauge.

E8.6.2 List and explain safety rules to follow when using hand drill, brace and bits, and boring or drilling tools.

E8.6.3 Identify parts of a hand drill and brace.

E8.6.4 Examine and identify boring and drilling tools. Explain uses for bits, drill points, and twist drills. Explain how auger bits and twist drills are classified and sized.

E8.6.5 Demonstrate how to use a hand drill and cutting tools or brace and bits. Include (a) laying out holes, (b) selecting tools, (c) clamping stock, (d) drilling or boring, (e) checking for straightness, (f) making blind holes, and (g) applying safety rules.

CRITERION-REFERENCED MEASURE

C8.6 Drill and bore holes using drilling and boring tools in accordance with instructor's specifications. All tools must be used safely and correctly.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Define and discuss key terms and concepts associated with drilling and boring (E8.6.1).
2. Discuss and demonstrate safety rules for use of drilling and boring tools and equipment (E8.6.2).
3. Display boring and drilling tools. Point out or illustrate parts of a drill and of a bit brace; explain how auger bits and twist drills are sized and classified; and discuss uses for each tool or piece of equipment (E8.6.3, E8.6.4).
4. Demonstrate how to use drilling and boring tools. Have students practice procedures, using scrap stock (E8.6.5).

SELECTED TOOLS AND MATERIALS

Hand drills in several sizes
Twist drills
Automatic (push) drill
Bit brace
Auger bits
Dowel bits
Forstner bits
Expansive bit
Depth gauge
Scratch awl
Screw mate
Clamps or vise
Try square
T-bevel
Scrap stock
Safety goggles

SELECTED AUDIOVISUAL MATERIALS

Film: Hand Tools for Woodworking (#58208). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.

Film: Sawing and Boring Tools. U. S. Army National Audio Visual Center, Washington, DC 20409. Also available in videocassette.

SELECTED REFERENCES

General Woodworking, 5th ed. Chris H. Groneman.

Working With Wood, pp. 91-99. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

9. USING FASTENERS AND CABINET JOINTS

TASKS/COMPETENCIES

9.1 Select and use nails and screws

9.2 Select and use fasteners

9.3 Identify adhesive types and uses

9.4 Describe cabinet construction techniques

Application

CONTENT/CONCEPT

9. USING FASTENERS AND CABINET JOINTS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

9.1 Select and use nails and screws

COURSE

Woods Technology I (8449)

9.1

PERFORMANCE OBJECTIVE

P9.1 Given resource materials, a list of projects to be completed, and assorted nails and screws, select and use the appropriate nails and/or screws for each job. The nails or screws selected must be appropriate for the project and fastened in accordance with instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E9.1.1 Identify the common types and sizes of screws used for joining wood. Explain how each type is used.

E9.1.2 Identify the most widely used types of nails for joining wood. Explain how each type and size is used.

E9.1.3 Define shank hole and pilot hole and demonstrate how these holes are used with nails and screws.

E9.1.4 Demonstrate how to drive a nail and how to prevent splints.

E9.1.5 Demonstrate how to install selected screws.

E9.1.6 Demonstrate how to countersink screws and explain the purpose of countersinking.

E9.1.7 Select the appropriate nails, screws, and tools for designated fastening jobs.

CRITERION-REFERENCED MEASURE

C9.1 Select and use the appropriate nails and/or screws for designated woodworking jobs. The nails or screws selected must be appropriate for the project and fastened in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display samples of common types and sizes of screws. Explain how each type is used (E9.1.1).

2. Display samples of common types and sizes of nails. Explain how each size and type is used (E9.1.2).

3. Demonstrate how to drill shank holes and pilot holes. Explain purpose of using holes with screws and nails (E9.1.3).

4. Demonstrate how to drive nails, using a variety of tools and types of nails. Show how to prevent splints (E9.1.4).

5. Demonstrate how to select the appropriate tool to install various types of screws. Demonstrate how to install screws (E9.1.5).

6. Demonstrate countersinking of screws and explain purpose for procedure (E9.1.6).

7. Have students select the appropriate nails, screws, and tools for assorted fastening jobs (E9.1.7).

SELECTED TOOLS AND MATERIALS

Display panel of screws and nails
Drill and drill bits
Countersink
Nails
Screws
Hammers
Screwdrivers

SELECTED AUDIOVISUAL MATERIALS

Transparencies: Woodworking Basics: Nails and Nailing and Wood Screws. DCA Educational Products. Available from Graves-Humphreys, Inc., 1948 Franklin Road, Roanoke, Virginia 24033.

SELECTED REFERENCES

Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

9. USING FASTENERS AND CABINET JOINTS

TASK/COMPETENCY

9.2 Select and use fasteners

Application

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

9.2

PERFORMANCE OBJECTIVE

P9.2 Given examples of molly bolts, miter joint fasteners, toggle bolts, repair plates, T-plates, bent corner plates, flat corner plates, chevrons, corrugated fasteners, or other special-purpose mechanical fasteners, list and identify the uses of eight out of the ten displayed fasteners. Install designated fasteners according to the instructor's specifications.

SELECTED ENABLING OBJECTIVES

E9.2.1 Identify special-purpose mechanical fasteners by name and explain how each type of fastener is used.

E9.2.2 Identify tools needed to install special-purpose mechanical fasteners.

E9.2.3 Build a display board of fasteners and label each fastener.

E9.2.4 Install designated fasteners as directed by the instructor.

CRITERION-REFERENCED MEASURE

C9.2 List and identify eight out of ten displayed special-purpose mechanical fasteners. Install designated fasteners according to the instructor's specifications.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display an assortment of special-purpose mechanical fasteners and explain how each fastener is used (E9.2.1).
2. Display tools needed to install special-purpose mechanical fasteners (E9.2.2).
3. Have selected students construct a display board of fasteners and label each fastener. Use board for an identification test (E9.2.3).
4. Have students install the fasteners on predetermined jobs or projects as necessary (E9.2.4).

SELECTED TOOLS AND MATERIALS

Paper and pencil
Hand tools as required
Assortment of fasteners

SELECTED AUDIOVISUAL MATERIALS

Transparencies: Woodworking Basics: Miscellaneous Fasteners. DCA Educational Products; available from Graves-Humphreys, Inc., 1948 Franklin Road, Roanoke, Virginia 24033.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
Working With Wood, pp. 145-146. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

9. USING FASTENERS AND CABINET JOINTS

TASK/COMPETENCY

9.3 Identify adhesive types and uses

Application

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

9.3

PERFORMANCE OBJECTIVE

P9.3 Given resource materials and a list of six types of adhesives (liquid hide glue, white liquid resin, resorcinol-resin glue, casein, contact cement, and epoxy resins), describe the characteristics and explain the purpose of each type to the instructor's satisfaction. Answers must indicate whether each adhesive can be used indoors, out-of-doors, or both.

SELECTED ENABLING OBJECTIVES

E9.3.1 Describe and discuss the characteristics and uses of selected types of adhesives. Include (a) name of adhesive, (b) uses, (c) advantages, (d) disadvantages, (e) clamping time, (f) color, (g) weatherability, and (h) mixing requirements.

E9.3.2 Test the characteristics of selected adhesives by glueing and properly clamping some scrap stock.

CRITERION-REFERENCED MEASURE

C9.3 Describe the characteristics and explain the purposes of liquid hide glue, white liquid resin, resorcinol-resin glue, casein, contact cement, and epoxy resins to the instructor's satisfaction. Answers must indicate whether each adhesive can be used indoors, out-of-doors, or both.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students read the text assignment on adhesives (E9.3.1).
2. Show audiovisual materials on how to use adhesives and follow up with a demonstration (E9.3.2).
3. Display and discuss different types of adhesives. Have students describe characteristics and uses of each type of adhesive (E9.3.1).
4. Demonstrate how to apply clamps. Have students practice glueing and clamping scrap stock to test characteristics of different types of adhesives (E9.3.2).

SELECTED TOOLS AND MATERIALS

Clamps ("C" screw)
Scrap lumber
Assorted adhesives

SELECTED AUDIOVISUAL MATERIALS

Film: Glues and Clamps (#10210). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film: Joining and Glueing. McGraw-Hill Book Company, 110 15th Street, Delmar, California 92014.
Film: Basics of Glueing and Clamping. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.

SELECTED REFERENCES

Basic Woodworking. John L. Feirer.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood, pp. 124-128. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

9. USING FASTENERS AND CABINET JOINTS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

9.4 Describe cabinet construction techniques

COURSE

Woods Technology II (8452)

9.4

PERFORMANCE OBJECTIVE

P9.4 Given information about common wood joints used for case, leg and rails, carcass, and door construction, describe technique appropriate to cabinet designs in accordance with instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E9.4.1 Identify joints used to glue up wood stock to increase width.

E9.4.2 Identify joints used for case and carcass construction.

E9.4.3 Identify joints used for leg and rail construction.

E9.4.4 Identify joints for door frames and panel construction.

CRITERION-REFERENCED MEASURE

C9.4 Describe cabinet construction technique in accordance with instructor's guidelines, for case, carcass, leg and rail, and door frame and panel construction.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display various joints, both on cabinets and individually (E9.4.1-E9.4.4).
2. Have students label illustrations with names of joints (E9.4.1-E9.4.4).
3. Demonstrate ways to make various joints (E9.4.1-E9.4.4).
4. Help students select appropriate joints for cabinets they are designing (E9.4.1-E9.4.4).

SELECTED TOOLS AND MATERIALS

Joints used in cabinets
Illustrations of various joints used in cabinets
Table saw
Jointer
Hand tools
Measuring tools

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Constructing and Manufacturing Wood Products. Wayne H. Zook.
Exploring Careers in Industry. Wilbur R. Miller, Marion E. Maddox, and Lavon B. Smith.

CONTENT/CONCEPT

10. PREPARING SURFACES FOR FINISHES

TASKS/COMPETENCIES

10.1 Repair or fill surface of wood

10.2 Select and use abrasives

Application

CONTENT/CONCEPT

10. PREPARING SURFACES FOR FINISHES

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

10.1 Repair or fill surface of wood

COURSE

Woods Technology I (8449)

10.1

PERFORMANCE OBJECTIVE

P10.1 Given a piece of wood with a deep grain, dents, or blemishes; plastic wood, putty, or other wood fillers; and the necessary tools and equipment; raise the dents and remove the blemishes. The materials selected must be appropriate for the project, and the repaired or filled surface must appear and feel smooth.

SELECTED ENABLING OBJECTIVES

E10.1.1 Identify the surfaces that require the raising of dents and removal of blemishes.

E10.1.2 Raise dents.

E10.1.3 Apply wood fillers.

E10.1.4 Apply plastic wood and putty.

E10.1.5 Remove surface blemishes.

CRITERION-REFERENCED MEASURE

C10.1 Raise dents and remove blemishes in wood requiring surface preparation, using wood fillers, plastic wood, or putty. Materials selected must be appropriate for the project, and the repaired or filled surface must appear and feel smooth.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students recognize the need for raising dents (E10.1.1).
2. Have students observe group or individual demonstration on how to raise dents, using a blotter and hot steam iron and/or wet cloth and soldering iron (E10.1.2).
3. Have students demonstrate how to raise dents and remove surface blemishes (E10.1.2, E10.1.5).
4. Have students observe group or individual demonstration on how to apply wood filler to open-grained woods (E10.1.3).
5. Have students demonstrate how to apply wood fillers as needed (E10.1.3).
6. Have students demonstrate how and when to apply plastic wood and putty (E10.1.4).
7. Have students demonstrate how to use shellac sticks (E10.1.4, E10.1.5).

SELECTED TOOLS AND MATERIALS

Hand steam iron
Ink blotter
Wet cloth
Soldering iron
Paste and/or liquid wood fillers
Plastic wood, wood putty
Shellac sticks
Blemished or dented wood stock

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood, pp. 159-162, 184-186. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

10. PREPARING SURFACES FOR FINISHES

TASK/COMPETENCY

10.2 Select and use abrasives

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

10.2

PERFORMANCE OBJECTIVE

P10.2 Given a piece of wood in need of surface preparation for finishing and a selection of woodworking abrasives, prepare the surface for finishing. Abrasive used must be appropriate for the project, and the surface must appear and feel smooth.

SELECTED ENABLING OBJECTIVES

E10.2.1 Define aluminum oxide, aught system, backing, bond, closed coat, coated adhesives, emery, flint, garnet, grit size, natural adhesives, open coat, pitch, silicone carbide, stearate, and synthetic abrasives.

E10.2.2 Identify three common woodworking abrasives.

E10.2.3 Explain how common abrasives are graded.

E10.2.4 List and discuss guidelines for selecting the correct abrasive for different types of surface preparation.

E10.2.5 Hand sand a flat surface.

E10.2.6 Sand an inside edge.

E10.2.7 Sand convex and concave edges.

CRITERION-REFERENCED MEASURE

C10.2 Prepare a wood surface for finishing, using woodworking abrasives. Abrasives used must be appropriate for the project, and the wood surface must appear and feel smooth.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Define and discuss key terms and concepts associated with woodworking abrasives (E10.2.1).

2. Have students participate in a class discussion on flint, garnet, aluminum oxide, and steel wool abrasives (E10.2.2).

3. Have students prepare a chart on how common abrasives are graded (E10.2.3).

4. Display samples of different types of abrasives and discuss ways to select the correct abrasive for different types of projects (E10.2.4).

5. Demonstrate use of hand sanding tools (E10.2.4, E10.2.6, E10.2.7).

6. Have students sand a flat surface, using a sanding block and/or chalkboard eraser (E10.2.5).

7. Have students sand an inside edge, using a large dowel rod or round file (E10.2.6).

8. Have students sand convex and concave edges (E10.2.7).

SELECTED TOOLS AND MATERIALS

Various abrasives
Sanding blocks
Woodworking vise and/or clamps
Lumber
Display panel of abrasives

SELECTED AUDIOVISUAL MATERIALS

Transparencies: Woodworking Basics: Abrasives and Abrasive Grit Size. DCA Educational Products; available from Graves-Humphreys, Inc., 1948 Franklin Road, Roanoke, Virginia 24033.

SELECTED REFERENCES

Basic Woodworking. John L. Feirer.
General Woodworking, 5th ed. Chris H. Groneman.

CONTENT/CONCEPT

11. FINISHING WOOD

TASKS/COMPETENCIES

11.1 Select and apply wood stains

11.2 Select and apply paint

11.3 Select and apply transparent finishes

CONTENT/CONCEPT

11. FINISHING WOOD

TASK/COMPETENCY

11.1 Select and apply wood stains

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

11.1

PERFORMANCE OBJECTIVE

P11.1 Given resource materials, a selection of wood stains, the necessary supplies and equipment, and pieces of wood, apply the wood stains to the wood in accordance with manufacturer's and instructor's directions. The color and type of stain selected must be appropriate for the project, the application must produce the color effect desired, and the stain must be applied evenly.

SELECTED ENABLING OBJECTIVES

E11.1.1 List, identify, and explain the different types of stains and how each type is used. Include (a) oil stains, (b) spirit stain, (c) water stain, (d) pigments, and (e) non-grain raising stains.

E11.1.2 Examine an assortment of brush types and sizes and discuss guidelines for selecting appropriate brushes to use in applying stains.

E11.1.3 Demonstrate how to select different stains.

E11.1.4 Collect and label samples of stained wood.

E11.1.5 Practice applying different kinds of stains, using scrap wood.

CRITERION-REFERENCED MEASURE

C11.1 Select the appropriate stain and apply to designated pieces of wood, in accordance with manufacturer's and instructor's directions. The type and color of stain selected must be appropriate for the project, the application must produce the color effect desired, and the stain must be applied evenly.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students read text assigned on staining (E11.1.1).
2. Have students list, identify, and explain how each type of stain is used (E11.1.1).
3. Have students describe soluble and insoluble pigments (E11.1.1).
4. Display an assortment of brush types and sizes and discuss appropriate use for each brush (E11.1.2).
5. Demonstrate how to select and use different stains. Have student practice using stains on scrap stock (E11.1.3, E11.1.5).
6. Have students collect and label samples of stained wood (E11.1.4).

SELECTED TOOLS AND MATERIALS

Paper and pencil
Assortment of wood stains
Brushes
Sponge
Rags
Scrap wood
Manufacturer's application instructions

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Basic Woodworking. John L. Feirer.
General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.

Application

CONTENT/CONCEPT

11. FINISHING WOOD

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

11.2 Select and apply paint

COURSE

Woods Technology I (8449)

11.2

PERFORMANCE OBJECTIVE

P11.2 Given a completed woodworking project in need of paint and the necessary paint materials, tools, and equipment, select and apply the paint. The surface of the wood must be covered completely and be free of blemishes and runs both while wet and after drying, and the dried finish must appear and feel smooth. The paint selected must be appropriate for the project and desired effect.

SELECTED ENABLING OBJECTIVES

E11.2.1 Identify and describe the characteristics of oil, enamel, latex, and acrylic paints.

E11.2.2 Select the proper paint for different types of jobs.

E11.2.3 Select the proper brush for different types of paint and jobs.

E11.2.4 Demonstrate how to apply paint.

E11.2.5 Demonstrate how to care for painting materials and equipment.

E11.2.6 Practice applying oil, enamel, latex, and acrylic paints, using scrap stock.

CRITERION-REFERENCED MEASURE

C11.2 Select and apply the appropriate paint for a woodworking project. The surface of the wood must be covered completely and be free of blemishes and runs both while wet and after drying, and the dried finish must appear and feel smooth. The paint selected must be appropriate for the project and desired effect.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Conduct class discussion on selection of proper paint. Discuss (a) differences in oil, enamel, latex, and acrylic paint, (b) exterior-interior application, (c) flat, gloss, semi-gloss finishes, (d) thinner for each type of paint, and (e) proper brush selection for type of paint as well as type of job (E11.2.1-E11.2.3).

2. Demonstrate how to paint (E11.2.4, E11.2.5). Include:

   Use of tack cloth
   Use of newspaper or drop cloth
   Mixing paint
   Tipping off brush
   Applying paint without runs
   Overlapping strokes
   Cutting-in
   Proper method of cleaning "self"
   Proper method of cleaning spills and drips
   Proper method of cleaning and storage of brushes

3. Supervise student practice in applying oil, enamel, latex, and acrylic paints, using scrap stock (E11.2.6).

SELECTED TOOLS AND MATERIALS

Paint brushes
Various paints
Empty containers
Newspaper and/or drop cloths
Thinners
Stir-sticks
Scrap wood
Color cards from commercial paint suppliers
Samples of painted wood

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
Basic Woodworking. John L. Feirer.
General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 6th ed. Chris H. Groneman.

Application

CONTENT/CONCEPT

11. FINISHING WOOD

TASK/COMPETENCY

11.3 Select and apply transparent finishes

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

11.3

PERFORMANCE OBJECTIVE

P11.3 Given resource materials on transparent finishes for wood; a woodworking project; an assortment of wax, shellac, varnish, lacquer, oil and polyurethane finishes; and the necessary equipment; select and apply transparent finish to a designated project. Finish selected must be appropriate in color and texture, the finish must be applied in accordance with the manufacturer's and instructor's directions, and the completed finished surface must be smooth and free of runs or misses.

SELECTED ENABLING OBJECTIVES

E11.3.1 Name and list the types of transparent finishes for wood. Describe each type and discuss the purpose, advantages, and disadvantages of each finish.

E11.3.2 Outline procedures for applying each of the following kinds of transparent finishes: (a) wax, (b) shellac, (c) varnish, (d) lacquer, (e) oils, and (f) polyurethane.

E11.3.3 Practice applying transparent finishes to scrap stock with rag, brush, or spray gun.

CRITERION-REFERENCED MEASURE

C11.3 Select and apply an appropriate transparent finish to a designated woodworking project. Finish selected must be appropriate in color and texture for the designated job or project, the finish must be applied in accordance with manufacturer's and instructor's directions, and the completed finished surface must be smooth and free of runs or misses.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display transparent finish samples and have students read text assignments on transparent finishes (E11.3.1).

2. Have students name and make a list of various transparent finishes for wood and describe the uses and characteristics of each finish (E11.3.1).

3. Demonstrate and discuss transparent finish application methods and procedures (E11.3.2).

4. Supervise student practice in applying various transparent finishes to scrap stock. Assist students in the selection of an appropriate finish for their woodworking project (E11.3.3).

SELECTED TOOLS AND MATERIALS

Various transparent finishes
Sandpaper (medium and fine)
Sanding block
Scrap stock
Brushes
Rags
Thinner
Spray equipment and spray booth

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
Basic Woodworking. John L. Feirer.
General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood, pp. 187-198. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

12. USING POWER TOOLS

TASKS/COMPETENCIES

12.1 Use scroll/jig saw

12.2 Use band saw

12.3 Use table (circular) saw

12.4 Use drill press

12.5 Use planer and surfacer

12.6 Use jointer

12.7 Use belt and disc sander

12.8 Use wood lathe

12.9 Use oscillating spindle sander

12.10 Use radial arm saw

12.11 Use shaper

CONTENT/CONCEPT

12. USING POWER TOOLS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

12.1 Use scroll/jig saw

COURSE

Woods Technology I (8449)

12.1

PERFORMANCE OBJECTIVE

P12.1 Given resource materials, a scroll/jig saw, wood stock, and the necessary safety equipment, set up and operate the scroll/jig saw in accordance with instructor's directions. The correct blade must be chosen for each designated project, and the saw must be operated safely.

SELECTED ENABLING OBJECTIVES

E12.1.1 Identify the parts of a jig saw and describe the saw's action.

E12.1.2 Discuss the uses of the scroll or jig saw.

E12.1.3 List and explain safety rules for use of a scroll or jig saw. Score at least 85 percent on a safety test.

E12.1.4 Identify types and uses of jig saw blades, and demonstrate how to change blades.

E12.1.5 Practice cutting wood with the scroll/jig saw safely and correctly.

CRITERION-REFERENCED MEASURE

C12.1 Set up and operate a scroll/jig saw in accordance with instructor's directions. The correct blade must be chosen for each designated project, and the saw must be operated safely.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display a scroll/jig saw, identify the parts, and discuss uses (E12.1.1, E12.1.2).
2. Have students view safety film and training film on the safe operation of the scroll/jig saw (E12.1.3).
3. Have students participate in class discussion and observe a demonstration on the safe use of the scroll/jig saw (E12.1.3).
4. Display and identify types of jig saw blades and demonstrate how to change blades (E12.1.4).
5. Supervise student practice in using scroll/jig saw (P12.1).

SELECTED TOOLS AND MATERIALS

Scroll/jig saw and blades
Scrap stock

SELECTED AUDIOVISUAL MATERIALS

Film:	Safety in the Shop--Power Tools (#37310). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film:	Scroll Saw (#37805). Audiovisual Services.
Film:	Scroll Saw. Sterling Educational Films, 241 East 34th Street, New York, New York 10016.
Film:	Shaper and Scroll Saw Safety. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.
Filmstrip:	Woodworking Tools and Machines: Jig Saw. Jam Handy School Services, Prentice-Hall Media, 150 White Plains Road, Terrytown, New York 10591.

SELECTED REFERENCES

Basic Woodworking. John L. Feirer.
General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood, pp. 223-228. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

12. USING POWER TOOLS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

12.2 Use band saw

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

12.2

PERFORMANCE OBJECTIVE

P12.2 Given resource materials, a band saw, wood stock, and the necessary safety equipment, set up and operate the band saw to make miter, curve, and free hand cuts. The saw must be operated in accordance with instructor's directions and must be operated safely.

SELECTED ENABLING OBJECTIVES

E12.2.1 Identify parts of a band saw. Include (a) guide wheels, (b) blade guards, (c) blade support wheel, (d) bar or post, (e) lower wheel guard, (f) table tilt, (g) upper wheel guard, (h) tension control, and (i) table.

E12.2.2 Discuss uses of a band saw and blade selection for different cutting operations.

E12.2.3 List and discuss safety rules for use of the band saw. Score at least 85 percent on a safety test.

E12.2.4 Demonstrate how to remove, replace, and adjust the blades and guides to make selected cuts.

CRITERION-REFERENCED MEASURE

C12.2 Set up and operate a band saw to make miter, curve, and free hand cuts. The saw must be operated in accordance with instructor's directions and must be operated safely.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display band saw, identify the parts, and discuss uses of band saw and blade selection for different cutting operations (E12.2.1, E12.2.2).
2. Have students view safety film on the safe use of band saw (E12.2.3).
3. Have students participate in class discussion on safety and observe class demonstration on the safe use of the band saw (E12.2.3, E12.2.4).
4. Have students observe a training film on band saw operations (E12.2.4).
5. Have students read text assignment on band saw operating instructions and safety rules (E12.2.3, E12.2.4).
6. Demonstrate how to remove, replace, and adjust blades and guides (E12.2.4).
7. Supervise student practice in using band saw to make various types of cuts (P12.2).

SELECTED TOOLS AND MATERIALS

Band saw
Scrap stock
Safety goggles
Shop apron

SELECTED AUDIOVISUAL MATERIALS

Film:	Band Saw (#29510). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film:	Safety in the Shop--Power Tools (#37310). Audiovisual Services.
Filmstrip:	Radial Arm and Band Saw Safety. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.
Filmstrip:	Band Saw and Scroll Saw (#6912M). McKnight Publishing Company, P. O. Box 2854, Bloomington, Illinois 61701.

SELECTED REFERENCES

General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood, pp. 229-234. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

12. USING POWER TOOLS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

12.3 Use table (circular) saw

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

12.3

PERFORMANCE OBJECTIVE

P12.3 Given resource materials, a table (circular) saw, operating instructions, and the necessary wood, operate the table (circular) saw and make adjustments in accordance with instructor's and manufacturer's directions. The saw must be operated safely and correctly, and adjustments must be made to the following parts: guard, splitter, fence, miter gauge, raising handle, and tilt handle.

SELECTED ENABLING OBJECTIVES

E12.3.1 Identify basic parts of a table saw and discuss various ways the table saw can be used. Explain how to apply safety rules during operation.

E12.3.2 Demonstrate knowledge of the safe operation of the table (circular) saw by scoring 100 percent on a safety test.

E12.3.3 Identify types of circular saw blades and demonstrate how to select the proper blade for specific jobs.

E12.3.4 Demonstrate how to make necessary adjustments on the table (circular) saw.

CRITERION-REFERENCED MEASURE

C12.3 Operate a table (circular) saw and make adjustments to the saw in accordance with instructor's and manufacturer's directions. The saw must be operated safely and correctly, and adjustments must be made to the following parts: guard, splitter, fence, miter gauge, raising handle, and tilt handle.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Show safety films on the operation of a table (circular) saw (E12.3.2).

2. Have students participate in a class discussion on safety and observe demonstration on the operation of the table (circular) saw. Discuss application of safety rules viewed in the film. Include (a) blade height, (b) proper placement of guard and splitters, (c) fence placement for ripping, (d) miter gauge placement and adjustment for cross cutting, (e) miter gauge placement and adjustment for angle cuts, (f) tilting blade for bevel cuts, and (g) checking blade for alignment with a square (E12.3.2).

3. Display sample circular saw blades and explain proper uses for each blade. Have students identify blades and select the proper blades for designated tasks (E12.3.3, E12.3.4).

4. Supervise student practice in the safe and correct operation of the table saw (P12.3).

SELECTED TOOLS AND MATERIALS

Table saw (circular)
Safety equipment (goggles and push stick)
Various circular saw blades

SELECTED AUDIOVISUAL MATERIALS

Film:	Circular Saw (#29810). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film:	Safety in the Shop (#37310). Audiovisual Services.
Filmstrip:	Circular Table Saw Safety. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.
Filmstrip:	The Tilting Arbor Table Saw (#6906M). McKnight Publishing Company, P. O. Box 2854, Bloomington, Illinois 61701.
Transparencies:	Stationary Power Tools: Circular Saw I and II. DCA Educational Products; available from Progressive School Products, 2856 Lamb Place, Memphis, Tennessee 38118.

SELECTED REFERENCES

General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood, pp. 235-244. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

12. USING POWER TOOLS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

12.4 Use drill press

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

12.4

PERFORMANCE OBJECTIVE

P12.4 Given resource materials, a drill press, boring tools, lumber, and the necessary safety equipment, set up and operate the drill press in accordance with instructor's direction. The correct boring tool must be selected for designated project, and all operations must conform to safety standards.

SELECTED ENABLING OBJECTIVES

E12.4.1 Discuss uses of a drill press, identify the parts of a drill press, and discuss operation and/or function of the depth stop, quill lock, quill, chuck, feed handle, column table, table locking clamp, and base.

E12.4.2 List and discuss safety rules for operation of a drill press. Score at least 85 percent in a safety test.

E12.4.3 Name the types of boring tools or attachments used in a drill press and describe their functions. Include (a) machine spur bits, (b) multi-spur bits, (c) Forstner bits, (d) twist drills, (e) spade bits, (f) hole saws, (g) power-bore bits, and (h) plug and sanding drums.

CRITERION-REFERENCED MEASURE

C12.4 Set up and operate a drill press in accordance with instructor's directions. The correct boring tool must be selected for designated project, and all operations must conform to safety standards.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Display a drill press, boring tools, and drill press attachments. Discuss uses of a drill press, identify the parts, and explain the operation and function of the drill press controls (E12.4.1).

2. Have students view safety film on the safe operation of the drill press and demonstrate how to apply safety rules (E12.4.2).

3. Display and identify drill press attachments and boring tools used on the drill press. Discuss uses for each tool or attachment (E12.4.3).

4. Have students select the proper boring tools or drill press attachment for a designated project (E12.4.3).

5. Demonstrate how to operate a drill press, using a variety of boring tools and drill press attachments. Supervise student practice in the safe operation of a drill press (P12.4).

SELECTED TOOLS AND MATERIALS

Drill press
Safety equipment (goggles, drill press vise, apron)
Selected boring tools
Lumber

SELECTED AUDIOVISUAL MATERIALS

Film: Drill Press (#81009). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film: Drill Press--Basic Holding Techniques (#79604). Audiovisual Services.
Film: The Drill Press (#79640). Audiovisual Services.
Film: Power Drill for Woodwork (#09810). Audiovisual Services.
Filmstrip: Planer, Disc Sander, Drill Press, and Grinder Safety. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.
Filmstrip: Woodworking Tools and Machines: Drill Press. Jam Handy School Services, Prentice-Hall Media, 150 White Plains Road, Terrytown, New York 10591.
Filmstrip: The Drill Press (#6913M). McKnight Publishing Company, P. O. Box 2854, Bloomington, Illinois 61701.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
Basic Woodworking. John L. Feirer.
General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.

CONTENT/CONCEPT

12. USING POWER TOOLS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

12.5 Use planer and surfacer

COURSE

Woods Technology II (8452)

12.5

PERFORMANCE OBJECTIVE

P12.5 Given a planer and surfacer, a backing board, and pieces of stock of random width, thickness, and length, safely plane the surfaces of each piece of stock to uniform thickness in accordance with instructor's directions. Short stock must be fed end-to-end; thin stock must be fed by using the backing board.

SELECTED ENABLING OBJECTIVES

E12.5.1 Define backing board, infeed roll, outfeed roll, self-feeding, and squaring.

E12.5.2 Identify the parts of the planer and surfacer: (a) table bed, (b) feed control, (c) depth gauge, and (d) elevating hand wheel.

E12.5.3 Identify safety rules which must be observed when using the planer and surfacer.

E12.5.4 Operate the planer and surfacer in accordance with safety rules.

CRITERION-REFERENCED MEASURE

C12.5 Safely plane pieces of short stock and thin stock in accordance with the instructor's directions. Short stock must be fed end-to-end; thin stock must be fed by using the backing board. Stock must be planed to uniform thickness as set by instructor.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students read the text assignment on the planer and surfacer (E12.5.1).
2. List the safety precautions for the planer and surfacer (E12.5.3).
3. Identify the parts of the planer and surfacer (E12.5.2).
4. Have the students read the operating instructions for the planer and surfacer (E12.5.3).
5. Demonstrate safe and correct use of planer and surfacer (E12.5.4).

SELECTED TOOLS AND MATERIALS

Planer and surfacer
Backing board
Pieces of stock cut to prescribed sizes (some less than 12 inches long and some less than 1/4 inch thick)
Ruler

SELECTED AUDIOVISUAL MATERIALS

Filmloops and tape cassettes:	Planer. DCA Educational Products; available from Progressive School Products, 2856 Lamb Place, Memphis, Tennessee 38118.
Filmstrip:	The Jointer and the Planer (#6907M). McKnight Publishing Company, P. O. Box 2854, Bloomington, Illinois 61701.

SELECTED REFERENCES

Exploring Woodworking. Fred W. Zimmerman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

12. USING POWER TOOLS

TASK/COMPETENCY

12.6 Use jointer

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology II (8452)

12.6

PERFORMANCE OBJECTIVE

P12.6 Given a jointer, several pieces of wood, and the necessary supplies, plane a face, edge, and end grain of wood pieces, and make bevel chamfer, rabbet, and taper cuts in accordance with instructor's directions. Jointer must be used safely and correctly; all planed and cut surfaces must be smooth, and the rabbet joint must be properly aligned.

SELECTED ENABLING OBJECTIVES

E12.6.1 Define infeed table, outfeed table, guard, fence, fence adjusting handle, front table adjusting wheel, rear table adjusting wheel, depth of cut scale, and switch.

E12.6.2 Identify safety rules which must be observed when using the jointer.

E12.6.3 Identify the face, edge, and end grain of a piece of wood.

E12.6.4 Identify the bevel, chamfer, rabbet, and taper cuts that can be made using a jointer.

E12.6.5 Practice operating the jointer to plane the face and edge of a piece of scrap stock.

CRITERION-REFERENCED MEASURE

C12.6 Use the jointer to plane the face, edge, and end grain of pieces of wood and make bevel, chamfer, rabbet, and taper cuts in accordance with instructor's directions. Jointer must be used safely and correctly; all planed cut surfaces must be smooth; and, in the case of the rabbet cut, the rabbet joint must be properly aligned.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students define the key terms and concepts related to the use of the jointer (E12.6.1).
2. Have students make a list of safety rules that pertain to the jointer (E12.6.2).
3. Have students define and identify face, edge, and end grain of a piece of wood (E12.6.3).
4. Demonstrate how to operate jointer to make bevel, chamfer, rabbet, and taper cuts (E12.6.4).
5. Have students practice operating jointer, using scrap stock (E12.6.5).

SELECTED TOOLS AND MATERIALS

Jointer
Pencil
Ruler
Lumber

SELECTED AUDIOVISUAL MATERIALS

Film: Jointer (#29610). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film: Safe Shop. McGraw-Hill Book Company, Princeton Road, Hightstown, New Jersey 08520.
Filmstrip: The Jointer and the Planer (#6907M). McKnight Publishing Company, P. O. Box 2854, Bloomington, Illinois 61701.

SELECTED REFERENCES

Basic Woodworking. John L. Feirer.
Exploring Woodworking. Fred W. Zimmerman.

CONTENT/CONCEPT

12. USING POWER TOOLS

TASK/COMPETENCY

12.7 Use belt and disc sander

Application

PROGRAM

Industrial Arts (109999)

COURSE

Woods Technology II (8452)

12.7

PERFORMANCE OBJECTIVE

P12.7 Given a piece of stock and a belt and disc sander, shape the edges, ends, and surface of a piece of stock in accordance with instructor's directions. Sander must be used safely and correctly, and all edges, ends, and surfaces must be smooth.

SELECTED ENABLING OBJECTIVES

E12.7.1 Define belt, disc, abrasive, machine's size, and platen or shoe.

E12.7.2 Identify safety rules which must be observed when using the belt and disc sander.

E12.7.3 Define and identify the main parts of the belt and disc sander: (a) adjustable table, (b) belt guard, (c) pushbutton switch, (d) miter gauge, and (e) stand.

E12.7.4 Sand the ends and surface of a piece of wood, using a belt and disc sander.

CRITERION-REFERENCED MEASURE

C12.7 Shape the edges, ends, and surface of a piece of stock, using the belt and disc sander in accordance with instructor's directions. Belt and disc sander must be used safely and correctly; all edges, ends, and surfaces must be smooth.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students define key terms and concepts related to the use of the belt and disc sander (E12.7.1).

2. Have students make a list of safety rules that pertain to the belt and disc sander (E12.7.2).

3. Have students identify the main parts of the belt and disc sander (E12.7.3).

4. Explain, demonstrate, and have students practice operation of a belt and disc sander (E12.7.4, P12.7).

SELECTED TOOLS AND MATERIALS

Belt and disc sander
Pencil
Rules
Stock

SELECTED AUDIOVISUAL MATERIALS

Film: Belt and Disc Sander (#44310). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film: Planer, Disc Sander, Drill Press and Grinder Safety. Abraxas Films, P. O. Box 146, Eugene, Oregon 97440.
Filmstrip: Sanding Machine (#6911M). McKnight Publishing Company, P. O. Box 2854, Bloomington, Illinois 61701.

SELECTED REFERENCES

Exploring Woodworking. Fred W. Zimmerman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

12. USING POWER TOOLS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

12.8 Use wood lathe

COURSE

Woods Technology II (8452)

12.8

PERFORMANCE OBJECTIVE

P12.8 Given a block of wood and a lathe, use the lathe to cut beads, coves, tapers, V-cuts, and shoulders in accordance with instructor's directions. Spindle-turning techniques must be used to cut round bases or lamp bases. Lathe must be used safely and correctly, and all cuts must be smooth and cut to desired shape.

SELECTED ENABLING OBJECTIVES

E12.8.1 Define gouge, skew, round nose chisel, square nose chisel, diamond-point chisel, and parting tool.

E12.8.2 Identify safety rules which must be observed when using the lathe.

E12.8.3 Define and identify the main parts of the lathe: (a) headstock, (b) tailstock, (c) tool support, (d) bed, (e) spindle lock, and (f) variable speed.

E12.8.4 Define spindle turning and face-plate turning.

E12.8.5 Identify shoulders, coves, tapers, V-cuts and beads.

E12.8.6 Demonstrate how to use wood lathes to cut beads, coves, tapers, V-cuts, and shoulders.

CRITERION-REFERENCED MEASURE

C12.8 Make a bead, cove, taper, V-cut, and shoulder, using the lathe in accordance with instructor's directions. Spindle-turning techniques must be used to cut round bases or lamp bases. Lathe must be used safely and correctly; all cuts must be smooth and cut to desired shape.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students define key terms related to the use of the wood lathe (E12.8.1).
2. Have students make a list of safety rules that pertain to the lathe and lathe tools (E12.8.2).
3. Have students define headstock, tailstock, tool support, bed, spindle lock, variable speed control, indexing pin, and tailstock clamp (E12.8.3).
4. Have students define face-plate turning and spindle turning (E12.8.4).
5. Have students display and identify coves, shoulders, tapers, V-cuts, and beads (E12.8.5).
6. Demonstrate lathe operation and spindle-turning techniques (E12.8.6, P12.8).

SELECTED TOOLS AND MATERIALS

Lathe tools
Lathe tool rest
Pencil
Ruler
Lumber
Mallet
Back saw
Headstock spindle
Tailstock spindle
Calipers

SELECTED AUDIOVISUAL MATERIALS

Filmloops: Lathe (#698761-2). McGraw-Hill Book Company/Webster Division. Princeton Road, Hightstown, New Jersey 08520.

SELECTED REFERENCES

Exploring Woodworking. Fred W. Zimmerman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

12. USING POWER TOOLS

TASK/COMPETENCY

12.9 Use oscillating spindle sander

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology II (8452)

12.9

PERFORMANCE OBJECTIVE

P12.9 Given a piece of stock with convex and concave edges, sand the edges, using the oscillating spindle sander in accordance with instructor's directions. Stock must be moved against the spindle rotation with smooth, even pressure, from left to right at a steady rate.

SELECTED ENABLING OBJECTIVES

E12.9.1 Define the parts of the oscillating spindle sander: table, tilting crank, spindle, base, sleeve.

E12.9.2 Identify safety rules which must be observed when using the oscillating spindle sander.

E12.9.3 Operate an oscillating spindle sander to smooth concave edges of wood stock.

CRITERION-REFERENCED MEASURE

C12.9 Sand the curved edges of the stock in accordance with the instructor's directions. Stock must be moved against the spindle rotation with smooth, even pressure, from left to right at a steady rate.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students read text assignment on oscillating spindle sander (E12.9.1).

2. Have students list safety rules for use of oscillating spindle sander (E12.9.2).

3. Demonstrate and supervise student practice in using the sander (E12.9.3, P12.9).

SELECTED TOOLS AND MATERIALS

Oscillating spindle sander
Stock cut to prescribed size
Pencil
Ruler

SELECTED AUDIOVISUAL MATERIALS

Filmstrip: Sanding Machine (#6911M). McKnight Publishing Company,
P. O. Box 2854, Bloomington, Illinois 61701.

SELECTED REFERENCES

Exploring Woodworking. Fred W. Zimmerman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

12. USING POWER TOOLS

TASK/COMPETENCY

12.10 Use radial arm saw

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology II (8452)

12.10

PERFORMANCE OBJECTIVE

P12.10 Given a radial arm saw and a piece of stock, safely cut angles, bevels, joints, and miters in accordance with instructor's directions. The proper blade must be selected and installed correctly for each operation.

SELECTED ENABLING OBJECTIVES

E12.10.1 Define dado, groove, miter, sand, rout, shape, and radial arm.

E12.10.2 Identify safety rules which must be observed when using the radial arm saw.

E12.10.3 Identify the main parts of the radial arm saw: (a) arm lock, (b) crank, (c) arm, (d) yoke, (e) motor, (f) swivel lock, (g) saw guard, (h) blade, (i) anti-kickback fingers, and (j) column.

E12.10.4 Explain crosscutting, ripping, and cutting dadoes, grooves, bevels, and miters.

E12.10.5 Operate a radial arm saw to cut angles, bevels, and miters.

CRITERION-REFERENCED MEASURE

C12.10 Safely cut angles, bevels, joints, and miters in accordance with instructor's directions. The proper blade must be selected and installed correctly for each operation.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students define dado, groove, miter, rout, shape, and sand (E12.10.1).
2. Have students make a list of safety rules that pertain to the radial arm saw (E12.10.2).
3. Have students identify the main parts of the radial arm saw (E12.10.3).
4. Supervise student practice in using the radial arm saw (E12.10.5, P12.10).

SELECTED TOOLS AND MATERIALS

Pencil
Rules
Lumber
Try square
Radial arm saw
Safety equipment

SELECTED AUDIOVISUAL MATERIALS

Film: Radial Arm Saw (#29110). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film: Radial Arm and Band Saw Safety. Abraxas Films, P. O. Box 146, Eugene, Oregon 97440.
Filmstrips: The Radial Arm Saw (#6908M). McKnight Publishing Company, P. O. Box 2854, Bloomington, Illinois 61701.

SELECTED REFERENCES

Exploring Woodworking. Fred W. Zimmerman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

12. USING POWER TOOLS

TASK/COMPETENCY

12.11 Use shaper

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology II (8452)

12.11

PERFORMANCE OBJECTIVE

P12.11 Given a shaper and several pieces of stock (some with irregular shapes), safely make a shaper cut in accordance with instructor's directions. Cutter assembly must be properly installed; the ring guard must be used for shaping irregular pieces, and stock must be fed against the cutter rotation.

SELECTED ENABLING OBJECTIVES

E12.11.1 Identify the parts of the shaper: (a) cutter, (b) miter gauge groove, (c) extension wing, (d) spindle, (e) access panel, (f) adjustable fence, (g) spindle raising wheel, and (h) clean-out door.

E12.11.2 Identify parts of the cutter assembly: nut, washer, and collars.

E12.11.3 Identify safety rules which must be observed when using the shaper.

E12.11.4 Define straight shaping, contour shaping, starting pins, and ring guard.

E12.11.5 Select correct cutter and set up machine for designated shaping operation.

CRITERION-REFERENCED MEASURE

C12.11 Safely make a shaper cut on either a straight or irregular piece of stock in accordance with the instructor's directions. Cutter assembly must be properly installed, the ring guard must be used for shaping irregular pieces, and stock must be fed against the cutter rotation.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students read text assignment on the shaper (E12.11.1, E12.11.4).
2. Have students read operating instructions for the shaper (E12.11.1, E12.11.3).
3. Have students list the safety precautions for the shaper (E12.11.3).
4. Demonstrate and supervise student practice in using the shaper (E12.11.5, P12.11).

SELECTED TOOLS AND MATERIALS

Shaper
Pieces of stock in prescribed sizes
Pencil
Ruler
Manufacturer's instructions

SELECTED AUDIOVISUAL MATERIALS

Film: Shaper and Scroll Saw Safety. Abraxas Films, P. O. Box 146, Eugene, Oregon 97440.

Film: Using the Shaper to Make Panel Doors (#00310). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.

SELECTED REFERENCES

Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.
Exploring Woodworking. Fred W. Zimmerman.

CONTENT/CONCEPT

13. USING PORTABLE POWER TOOLS

TASKS/COMPETENCIES

13.1 Use portable electric drills

13.2 Use electric hand sanders

13.3 Use saber saws

13.4 Use the router

13.5 Use the portable circular saw

Application

CONTENT/CONCEPT

13. USING PORTABLE POWER TOOLS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

13.1 Use portable electric drills

COURSE

Woods Technology I (8449)

13.1

PERFORMANCE OBJECTIVE

P13.1 Given instructions and resource materials, an electric drill, safety goggles, selected boring tools, and scrap stock, operate the drill. All operations, including handling and chuck and drill mounting, must conform to safety standards and must be in accordance with instructor's directions.

SELECTED ENABLING OBJECTIVES

E13.1.1 List and discuss rules for safe operation of an electric drill. Score 85 percent on a safety test.

E13.1.2 Identify and discuss drill sizes (1/4, 3/8, 1/2 inch) and examine and identify twist drills, masonry drills, speed bores, spade bits, wire brushes, or other boring tools used with an electric drill. Discuss uses for each drill size and boring tool.

E13.1.3 Explain and/or demonstrate the following: (a) application of safety rules; (b) how to use double-insulated portable tools and a ground plug and/or adapter for proper grounding; (c) how to select drill size and the proper boring tool; (d) use of drill stops or depth gauges; and (e) methods used to drill straight, such as try square, square, dowelling, or jig.

E13.1.4 Select the proper boring tool for designated projects.

E13.1.5 Demonstrate the safe and correct operation of a portable electric drill for drilling holes for wood screws.

CRITERION-REFERENCED MEASURE

C13.1 Operate an electric drill in accordance with instructor's directions. All operations, including handling and chuck and drill mounting, must conform to safety standards.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students view safety films on use of the portable drill. Give safety test after classroom demonstration (E13.1.1).

2. Display different sizes of drills and selected boring tools. Have students identify each drill or tool and discuss uses (E13.1.2).

3. Demonstrate the safe and proper use of an electric drill. Discuss the following topics: (a) safety, (b) grounding, (c) drill size and boring tool selection, (d) drill stops and depth gauges, and (e) drilling methods (E13.1.3).

4. Have students practice selecting the proper boring tools or drill sizes for designated jobs (E13.1.4).

5. Supervise student practice in operation of an electric drill (E13.1.5, P13.1).

SELECTED TOOLS AND MATERIALS

Portable electric drill
Woodworking vise
Grounding adapter, if necessary
Safety goggles
Selected boring tools
Wood

SELECTED AUDIOVISUAL MATERIALS

Film:	Portable Power Tools (#58308). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Filmstrip:	Hand Held Power Tool Safety and Hand and Power Sanding. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, et al.
General Woodworking, 5th ed., p. 215. Chris H. Groneman.

CONTENT/CONCEPT

13. USING PORTABLE POWER TOOLS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

13.2 Use electric hand sanders

COURSE

Woods Technology I (8449)

13.2

PERFORMANCE OBJECTIVE

P13.2 Given instructions and resource material, an electric hand sander and/or orbital sander, abrasives, and project stock, operate the sander. All operations must conform to safety standards and must be in accordance with instructor's directions.

SELECTED ENABLING OBJECTIVES

E13.2.1 List and discuss safety rules for sanding and operation of the belt and orbital hand sanders. Score 85 percent on a safety test.

E13.2.2 Discuss proper uses of electric hand sanders.

E13.2.3 Select proper abrasives for designated project.

E13.2.4 Change the abrasive paper or cloth on an orbital sander.

E13.2.5 Change the abrasive belt on a hand belt sander.

CRITERION-REFERENCED MEASURE

C13.2 Operate an electric hand sander and/or orbital sander. All operations must conform to safety standards and must be in accordance with instructor's directions.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss and demonstrate safety rules for use of orbital and electric hand sanders. Give safety test (E13.2.1).

2. Display electric hand sanders and an assortment of abrasive papers. Discuss proper uses for sanders and demonstrate how to select the proper abrasive for designated projects (E13.2.2, E13.2.3).

3. Demonstrate how to change the abrasive paper or cloth on an orbital sander and how to change the abrasive belt on a hand belt sander (E13.2.4, E13.2.5).

4. Supervise student practice in the safe and correct operation of electric hand sanders (P13.2).

SELECTED TOOLS AND MATERIALS

Electric hand belt sander
Electric orbital sander
Scrap stock
Appropriate abrasives
Safety goggles

SELECTED AUDIOVISUAL MATERIALS

Film: The Belt and Disc Sander (#44310). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film: Portable Power Tools (#58308). Audiovisual Services.
Filmstrip: Hand Held Power Tool Safety and Hand and Power Sanding. Abraxas Films, P. O. Box 1416, Eugene, Oregon 97440.

SELECTED REFERENCES

General Shop Woodworking, 6th ed. Verne C. Fryklund and Armand J. LaBarge.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood, pp. 288-292. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

Application

CONTENT/CONCEPT

13. USING PORTABLE POWER TOOLS

TASK/COMPETENCY

13.3 Use saber saw

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

13.3

PERFORMANCE OBJECTIVE

P13.3 Given resource material and instructions, a saber saw and blades, a ripping guide, and scrap stock, cut beveled, straight, and curved lines, using the saber saw. All operations must conform to safety standards and must be in accordance with instructor's directions.

SELECTED ENABLING OBJECTIVES

E13.3.1 List and discuss safety rules for operation of a saber saw. Score 85 percent on a safety test.

E13.3.2 Identify the parts of a saber saw.

E13.3.3 Identify types and sizes of saber saw blades. Discuss blade selection and demonstrate how to insert and/or replace blades.

E13.3.4 Demonstrate proper placement of lumber when using a saber saw (good side down because of up cutting stroke).

E13.3.5 Demonstrate how to use a saber saw and ripping guide to make straight cuts.

E13.3.6 Demonstrate how to use a saber saw to make curved cuts.

CRITERION-REFERENCED MEASURE

C13.3 Cut beveled, straight, and curved lines, using a saber saw. All operations must conform to safety standards and must be in accordance with instructor's directions.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Explain and demonstrate safety rules for operation of saber saws. Give safety test (E13.3.1).
2. Display saber saw, identify parts, and discuss uses (E13.3.2).
3. Display different sizes and types of saber saw blades and discuss appropriate uses for each blade. Demonstrate how to insert and/or replace blades (E13.3.3).
4. Demonstrate safe and correct operation of saber saws. Include the following topics: (a) safety; (b) grounding: (c) proper placement of lumber; (d) blade slection: and (e) methods of making straight, beveled, and circular cuts (E13.3.4-E13.3.6).

SELECTED TOOLS AND MATERIALS

Saber saw and blades
Drill
Lumber
Ripping guide

SELECTED AUDIOVISUAL MATERIALS

Film: Portable Power Tools (#58308). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Audiovisual kit: Portable Power Saws. BFA Educational Media, 468 Park Avenue South, New York, New York 10016.

SELECTED REFERENCES

Basic Industrial Arts Woodworking. Wilbur R. Miller, *et al*.
General Woodworking, 5th ed. Chris H. Groneman.
Working With Wood, pp. 227-228. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

——Application——

CONTENT/CONCEPT

13. USING PORTABLE POWER TOOLS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

13.4 Use router

COURSE

Woods Technology II (8452)

13.4

PERFORMANCE OBJECTIVE

P13.4 Given a piece of stock and a router, cut a cove, rabbet, dado, dovetail, and ogee in accordance with instructor's directions. The router must be used safely and correctly.

SELECTED ENABLING OBJECTIVES

E13.4.1 Define straight cut, beading, chamfering, and rounding.

E13.4.2 Identify the safety rules which must be observed when using the router.

E13.4.3 Identify router bits and their different shapes.

E13.4.4 Identify the main parts of the router: (a) miter, (b) handle, (c) base, (d) switch, (e) router bit, (f) chuck, and (g) straight guide.

E13.4.5 Practice using the router to make selected cuts in wood.

CRITERION-REFERENCED MEASURE

C13.4 Cut a cove, rabbet, dovetail, ogee, and a dado, using the router in accordance with the instructor's directions. The router must be used safely and correctly.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students define key terms and concepts related to router operation (E13.4.1).
2. Have students make a list of safety rules that pertain to the router (E13.4.2).
3. Have students list the types of router bits and name the main parts of the router (E13.4.2, E13.4.3).
4. Demonstrate setup and operation of the router (E13.4.4, E13.4.5).
5. Supervise student practice in using the router (E13.4.5).

SELECTED TOOLS AND MATERIALS

Router and bits
Pencil
Router wrench
Ruler
Stock
Router guide

SELECTED AUDIOVISUAL MATERIALS

Film:	Overarm Router (#17306). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Transparency:	Overarm Router. DCA Educational Products; available from Graves-Humphreys, Inc., 1948 Franklin Road, Roanoke, Virginia 24033.

SELECTED REFERENCES

Exploring Woodworking. Fred W. Zimmerman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

13. USING PORTABLE POWER TOOLS

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

13.5 Use portable circular saw

COURSE

Woods Technology II (8452)

13.5

PERFORMANCE OBJECTIVE

P13.5 Given a portable circular saw and a large piece of stock, rip and cross-cut a piece of plywood in accordance with instructor's directions. Saw operation must conform to safety standards.

SELECTED ENABLING OBJECTIVES

E13.5.1 Identify and explain the purpose of the portable circular saw.

E13.5.2 Identify safety rules which must be observed when using the portable circular saw.

E13.5.3 Identify the parts of the portable circular saw.

E13.5.4 Practice using a portable circular saw to make selected cuts.

CRITERION-REFERENCED MEASURE

C13.5 Rip and cross-cut a large piece of stock, using portable circular saw in accordance with instructor's directions. Portable circular saw must be used safely and properly.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Have students identify and explain the purpose of the portable circular saw (E13.5.1).
2. Have students write a list of safety procedures (E13.5.2).
3. Have students list the parts and name the different types of blades of the portable circular saw (E13.5.3).
4. Demonstrate how to use portable circular saw to make different types of cuts (E13.5.4).
5. Supervise student practice in using portable circular saw (E13.5.4, P13.5).

SELECTED TOOLS AND MATERIALS

Portable circular saw
Blades
Aprons
Safety goggles

SELECTED AUDIOVISUAL MATERIALS

Film: Safety in the Shop--Power Tools (#37310). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.
Film: Circular Table Saw Safety. Abraxas Films. P. O. Box 146, Eugene, Oregon 97440.

SELECTED REFERENCES

Exploring Woodworking. Fred W. Zimmerman.
Working With Wood. Gilbert Hutchings, Eugene Martin, and Mario Coleman.

CONTENT/CONCEPT

14. RECONDITIONING FURNITURE

TASKS/COMPETENCIES

14.1 Repair broken furniture

14.2 Refinish furniture

CONTENT/CONCEPT

14. RECONDITIONING FURNITURE

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

14.1 Repair broken furniture

COURSE

Woods Technology II (8452)

14.1

PERFORMANCE OBJECTIVE

P14.1 Given resource materials and instructions; a piece of broken furniture; safety equipment; filler; glue; and the necessary clamps, hand tools, or power tools; repair the piece of furniture in accordance with instructor's directions. All joints must be glued or fastened securely, all surfaces must be smooth to touch as required, and the piece of furniture must be restored to its original function.

SELECTED ENABLING OBJECTIVES

E14.1.1 Discuss types of furniture repairs and observe demonstrations on common repair problems and methods. Outline procedures for the following repairs: (a) sticking drawers, (b) worn drawers, (c) cracks and breaks, (d) shelf reinforcements, (e) invisible repairs, (f) renovation of porch and patio furniture, and (g) fastening joints.

E14.1.2 Analyze selected furniture repair problems, list the needed repairs, and outline tools, materials, and methods needed to make the repairs.

E14.1.3 Practice making furniture repairs.

CRITERION-REFERENCED MEASURE

C14.1 Repair a piece of broken furniture in accordance with instructor's directions. All joints must be glued or fastened securely, all surfaces must be smooth to touch as required, and the piece of furniture must be restored to its original function.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss types of furniture repairs and display tools, equipment, and materials needed to make selected repairs. Demonstrate safe repair methods and procedures for the following: (a) sticking drawers, (b) worn drawers, (c) cracks and breaks, (d) shelf reinforcement, (e) invisible repairs, (f) renovation of porch and patio furniture, and (e) fastening joints (E14.1.1).

2. Demonstrate how to analyze furniture repair problems. Have students list the tools, materials, equipment, and repair methods needed to repair selected pieces of furniture (E14.1.2).

3. Supervise student practice in repairing broken or malfunctioning furniture (E14.1.3).

SELECTED TOOLS AND MATERIALS

Hand power and/or machine tools
Hand tools
Clamps
Various hardware and software
Glue
Goggles and apron
Paper and pencil

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Reader's Digest-Complete Do-It-Yourself Manual. The Reader's Digest Association, Inc.

CONTENT/CONCEPT

14. RECONDITIONING FURNITURE

PROGRAM

INDUSTRIAL ARTS (109999)

TASK/COMPETENCY

14.2 Refinish furntiure

COURSE

Woods Technology II (8452)

14.2

PERFORMANCE OBJECTIVE

P14.2 Given resources and instructions, a piece of used furniture, stripping materials and tools, abrasives, and the necessary finishing tools and supplies, strip and refinish the piece of furniture. The surface must be stripped, prepared for refinishing, and refinished in accordance with instructor's directions.

SELECTED ENABLING OBJECTIVES

E14.2.1 List and discuss safety rules for use of stripping and refinishing tools and materials.

E14.2.2 Discuss and demonstrate how to identify, select, use, and clean stripping or other refinishing materials.

E14.2.3 Demonstrate how to strip a piece of furniture.

E14.2.4 Demonstrate how to use abrasives and scrapers to prepare a wood surface for refinishing (P.8.5).

E14.2.5 Identify tools, materials, and equipment needed to refinish wood, using stains or transparent finishes (P11.1, P11.3).

E14.2.6 Demonstrate how to apply stains and transparent finishes to a piece of furniture.

CRITERION-REFERENCED MEASURE

C14.2 Strip and refinish a piece of furniture. The surface must be stripped, prepared for refinishing, and refinished in accordance with instructor's directions.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss safety rules for use of stripping and refinishing tools and materials (E14.2.1).
2. Demonstrate how to use paste, semi-paste, and liquid commercial stripping materials; how to use a putty knife, coarse steel wool, a toothbrush or individually designed tools in the stripping process; and ways to use Varsol or other thinners to clean stripping materials or stripped surfaces (E14.2.2, E14.2.3).
3. Demonstrate how to use abrasives and scrapers to prepare a wood surface for refinishing (E14.2.4).
4. Display tools, equipment, and materials needed to refinish wood. Discuss uses and types of stains and transparent finishes (E14.2.5, E8.5.1, E10.2.4).
5. Demonstrate how to apply stains and transparent finishes (E14.2.6, E8.5.1, E10.2.4).

SELECTED TOOLS AND MATERIALS

Goggles
Putty knives
Drop cloth
Brushes
Rubber gloves
Abrasives
Wood stains
Transparent finishes

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Reader's Digest-Complete Do-It-Yourself Manual. The Reader's Digest Association, Inc.

CONTENT/CONCEPT

15. INTEGRATING THE STUDENT ORGANIZATION THROUGHOUT THE COURSE

TASKS/COMPETENCIES

15.1 Participate in AIASA classroom activities

15.2 Investigate community industrial and technical resources

15.3 Participate in school (or community) improvement activities

15.4 Participate in group marketing enterprise project

15.5 Plan and participate in competitions

Application

CONTENT/CONCEPT

15. INTEGRATING THE STUDENT ORGANIZATION THROUGHOUT THE COURSE

TASK/COMPETENCY

15.1 Participate in AIASA classroom activities

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

15.1

PERFORMANCE OBJECTIVE

P15.1 Given resources, teacher guidance, and the opportunity, participate in American Industrial Arts Student Association (AIASA) classroom activities in accordance with instructor's guidelines.

SELECTED ENABLING OBJECTIVES

E15.1.1 Identify and discuss goals of the AIASA.

E15.1.2 Participate in classroom elections for AIASA officers. Define and discuss duties of class president, secretary, treasurer, reporter, sergeant-at-arms, parliamentarian, and historian.

E15.1.3 Participate as officer or voting member in democratic classroom decision-making activities.

CRITERION-REFERENCED MEASURE

C15.1 Participate in AIASA classroom activities in accordance with instructor's guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. List and discuss the goals of AIASA. Provide students with background on the local, state, and national organizations (E15.1.1).

2. Have students organize class for association activities. Supervise election of class officers and discuss duties of officers and members (E15.1.2).

3. Review parliamentary procedure as necessary and serve in an advisory capacity during group meetings (E15.1.3).

4. Display association seal, motto, and goals on classroom bulletin board (E15.1.1).

SELECTED TOOLS AND MATERIALS

Officer symbols
Banner
Notebooks

SELECTED AUDIOVISUAL MATERIALS

Film: Art of Communication: How to Conduct a Meeting (#21908). Audiovisual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.

TV Tape: In-Class AIASA Management. Industrial Arts Education Service, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216.

Slides: Move With Tomorrow. Industrial Arts Education Service.

Slides: AIASA--A Classroom Experience. National AIASA, 1908 Association Drive, Reston, Virginia 22091.

SELECTED REFERENCES

Student Association Activities in Industrial Arts Instruction. Industrial Arts Education Service.

CONTENT/CONCEPT

15. INTEGRATING THE STUDENT ORGANIZATION THROUGHOUT THE COURSE

TASK/COMPETENCY

15.2 Investigate community (industrial) and technical resources

Application

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

15.2

PERFORMANCE OBJECTIVE

P15.2 Given resources and an opportunity to participate in AIASA classroom activities, participate in a class-planned activity to investigate community and technical resources in accordance with student organization guidelines.

SELECTED ENABLING OBJECTIVES

E15.2.1 Serve on committee to identify and discuss possible community and technical resources to investigate.

E15.2.2 List and discuss factors involved in successful planning for a field trip or guest speaker.

E15.2.3 Participate in committee or class activities to select a possible classroom speaker or to plan a class field trip.

E15.2.4 Prepare safety posters for local wood-related industry.

CRITERION-REFERENCED MEASURE

C15.2 Participate in a class planned activity to investigate community and technical resources in accordance with student organization guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Assist students and class committee in identifying possible community and technical resources to investigate as a student organization project (E15.2.1).
2. Discuss factors involved in successful planning for a field trip or guest speaker (E15.2.2).
3. Have students invite speakers from industry to speak on topics of interest or to give special demonstrations. Involve students in selecting and planning field trips (E15.2.3).
4. Offer students credit for safety posters they make for local woods industry (E15.2.4).

SELECTED TOOLS AND MATERIALS

Directories listing local industries

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Student Association Activities in Industrial Arts Instruction. Industrial Arts Education Service.

CONTENT/CONCEPT

15. INTEGRATING THE STUDENT ORGANIZATION THROUGHOUT THE COURSE

TASK/COMPETENCY

15.3 Participate in school (or community) improvement activities

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)

15.3

PERFORMANCE OBJECTIVE

P15.3 Given the resources and an opportunity to participate in AIASA classroom activities, participate in class-planned community or school improvement activity in accordance with student organization guidelines.

SELECTED ENABLING OBJECTIVES

E15.3.1 List and discuss possible school or community improvement projects.

E15.3.2 List and discuss factors to consider when planning and carrying out successful group projects.

E15.3.3 Select a community or school improvement project, determine tasks to be done, and determine duties and responsibilities of class members. Evaluate success of project upon completion.

CRITERION-REFERENCED MEASURE

C15.3 Participate in a class-planned community or school improvement project in accordance with student organization guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Help students identify possible school or community improvement projects (E15.3.1).
2. Discuss factors to consider when planning and carrying out successful group projects (E15.3.2).
3. Help students select, plan, implement, and evaluate a school or community improvement project (E15.3.3).
4. Help AIASA students manage a furniture repair service for school personnel (E15.3.3).

SELECTED TOOLS AND MATERIALS

Directories of local service and social agencies in community

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Student Association Activities in Industrial Arts Instruction.
Industrial Arts Education Service.

CONTENT/CONCEPT

15. INTEGRATING THE STUDENT ORGANIZATION THROUGHOUT THE COURSE

TASK/COMPETENCY

15.4 Participate in group marketing enterprise project

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

15.4

PERFORMANCE OBJECTIVE

P15.4 Given resources, tools, equipment, supplies, and an opportunity to participate in AIASA classroom activities, participate in a group marketing enterprise project in accordance with student organization guidelines.

SELECTED ENABLING OBJECTIVES

E15.4.1 Identify and discuss possible marketing enterprise projects suitable for a classroom student organization.

E15.4.2 List and discuss factors to consider when planning and implementing a group marketing enterprise project.

E15.4.3 Select a group marketing enterprise project, determine tasks to be done, and determine duties of class members. Evaluate success of project upon completion.

CRITERION-REFERENCED MEASURE

C15.4 Participate in a group marketing enterprise project in accordance with guidelines provided by the student organization.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Help students identify possible marketing enterprise projects. Share previous project experiences (E15.4.1).
2. Discuss factors to consider when planning and implementing a group marketing enterprise project. Include mass production techniques (E15.4.2).
3. Help students plan, organize, implement, and evaluate a group marketing enterprise project (E15.4.3).

SELECTED TOOLS AND MATERIALS

None identified

SELECTED AUDIOVISUAL MATERIALS

None identified

SELECTED REFERENCES

Student Association Activities in Industrial Arts Instruction. Industrial Arts Education Service.

Application

CONTENT/CONCEPT

15. INTEGRATING THE STUDENT ORGANIZATION THROUGHOUT THE COURSE

TASK/COMPETENCY

15.5 Plan and participate in competitions

PROGRAM

INDUSTRIAL ARTS (109999)

COURSE

Woods Technology I (8449)
Woods Technology II (8452)

15.5

PERFORMANCE OBJECTIVE

P15.5 Given resources, the necessary tools, equipment, materials, and an opportunity to participate in AIASA classroom activities, plan and/or participate in a local, state, or national competition in accordance with school policies and student organization guidelines.

SELECTED ENABLING OBJECTIVES

E15.5.1 Discuss types and purposes of competitions. Identify standards for achievement in craft, performance, and safety.

E15.5.2 Examine or establish procedures and rules for a contest. Discuss skills or qualifications needed to enter the competition.

E15.5.3 Determine how achievements will be recognized or regarded after the competition.

E15.5.4 Enter and/or conduct a competition in class.

CRITERION-REFERENCED MEASURE

C15.5 Participate in a local, state, or national competition in accordance with school policies and student organization guidelines.

SELECTED INSTRUCTIONAL ACTIVITIES

1. Discuss types and purposes of competitions (E15.5.1).
2. Display sample contest entry forms and rules. Discuss competition procedures and skills or qualifications needed to enter designated competitions (E15.5.2).
3. Discuss ways achievement is rewarded or recognized in competitions (E15.5.3).
4. Help students enter and/or conduct a local competition (E15.5.4).

SELECTED TOOLS AND MATERIALS

None identified

SELECTED AUDIOVISUAL MATERIALS

Slides of previous contests or competitions, if available

SELECTED REFERENCES

AIASA--Competitive Event Guidelines. National AIASA.
Standards for AIASA Events. Industrial Arts Education Service.
Student Association Activities in Industrial Arts Instruction.
Industrial Arts Education Service.

BIBLIOGRAPHY

Bame, E. Allen. Using Metrics in Industrial Arts. Richmond, Virginia: Industrial Arts Education Service, Virginia Department of Education, 1979.

The Book of Tests: Safety Tests for Woodworking. Eugene, Oregon: Abraxas Films, 1982.

Competency-Based Instruction in Woods Technology I. Richmond, Virginia: Industrial Arts Education Service, Virginia Department of Education.

Douglass, J. H. Projects in Wood Furniture. Bloomington, Illinois: McKnight Publishing Company, 1967.

Encyclopedia of Careers and Vocational Guidance. Vol. I & II, Revised, Chicago, Illinois: Doubleday & Company, Inc., 1972.

Fales, James; Sheets, Everett; Mervich, Gregg; and Dinan, John. Manufacturing: A Basic Text for Industrial Arts. Bloomington, Illinois: McKnight Publishing Company, 1980.

Feirer, John L. Basic Woodworking. Peoria, Illinois: Charles A. Bennett Company, Inc., 1978.

Feirer, John L. and Gilbert Hutchings. Advanced Woodworking and Furniture Making. Peoria, Illinois: Bennett Publishing Company, 1980.

Fryklund, Verne C. and LaBarge, Armand J. General Shop Woodworking, 6th ed. Bloomington, Illinois: McKnight Publishing Company, 1965.

Groneman, Chris H. General Woodworking, 5th ed. New York: McGraw-Hill Book Company, 1975.

Groneman, Chris H. General Woodworking, 6th ed. New York: McGraw-Hill Book Company, 1981.

Hamond, James J. Woodworking Technology. Bloomington, Illinois: McKnight Publishing Company, 1980.

Hutchings, Gilbert; Martin, Eugene; and Coleman, Mario. Working With Wood. Bloomington, Illinois: McKnight Publishing Company, 1982.

Miller, Wilbur R.; Zook, Wayne H.; Maddox, Marion E.; and Smith, Lavon B. Exploring Careers in Industry. Bloomington, Illinois: McKnight Publishing Company, 1966.

Miller, Wilbur R.; Zook, Wayne H.; Maddox, Marion E.; and Smith, Lavon B. Basic Industrial Arts Woodworking. Bloomington, Illinois: McKnight Publishing Company, 1978.

National AIASA. AIASA Competitive Event Guidelines. Reston, Virginia: American Industrial Arts Student Association.

Organizing the Industrial Arts Student Association, Guide 1. Richmond, Virginia: Virginia Department of Education, 1978.

Reader's Digest - Complete Do-it-Yourself Manual. Pleasantville, New York: The Reader's Digest Association, Inc., 1973.

Roberts, Henry M. Roberts Rules of Order. Glenview, Illinois: Scott, Foresman and Company, 1976.

Standards for AIASA Events (Permanent Rules for Regional Fairs and Virginia Industrial Arts Spring Festival). Richmond, Virginia: Industrial Arts Education Service, Virginia Department of Education.

Student Association Activities in Industrial Arts, Guide 2, Richmond, Virginia: Virginia Department of Education, 1981.

Student Association Activities in Industrial Arts Instruction. Richmond, Virginia: Industrial Arts Service, Virginia Department of Education, 1979.

U.S. Department of Agriculture. Wood Handbook, Basic Information on Wood. Washington, D.C.: Government Printing Office, 1955.

U.S. Department of Labor. Dictionary of Occupational Titles. Washington, D.C.: U.S. Government Printing Office, 1977.

U.S. Department of Labor. Occupational Outlook Handbook. Washington, D.C.: U.S. Government Printing Office, 1980-81.

Zimmerman, Fred W. Exploring Woodworking. South Holland, Illinois: Goodheart-Willcox Co., Inc., 1979.

Zook, Wayne H. Constructing of Manufacturing Wood Products. Bloomington, Illinois: McKnight Publishing Co., 1973.

APPENDICES

A - Audiovisual Aids

B - Project Ideas and Sources

C - Resources for Research in Woods Technology

D - Approved Tool and Equipment List

APPENDIX A

AUDIOVISUAL AIDS

I. Films, filmstrips, audiovisual kits, slides, or TV tapes available from Virginia Department of Education

A. Available from Audio Visual Services, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216

A B Cs of Hand Tools I & II (#20810 & #20910)
Art of Communication: How to Conduct a Meeting, (#21908)
Band Saw, (#29510)
The Belt and Disc Sander, (#44310)
Building a House, (#76904)
Careers in Building Trades, (#80812)
Careers in Industry, (#79912)
Chisels, (#10110)
Circular Saw, (#29810)
The Drill Press, (#79640)
Drill Press, (#81009)
Drill Press - Basic Holding Techniques, (#79604)
Glues and Clamps (#10210)
Hand Tools for Woodworking, (#58208)
Industrial Arts Hand Saws, (#61104)
Industrial Arts - Knowing Your Wood (#33909)
Jointer (#29610)
Learning About Metric Measures (#68709)
Let Us Measure - Using Standard Units (#16204)
Measure Metric -2- Measure Length (#22890)
Overarm Router (#17306)
Planes (#10109)
Portable Power Tools (#58308)
Power Drill for Woodworking (#09810)
Radial Arm Saw (#29710)
Safety in the Shop - Power Tools (#37310)
Sam Moloof - Woodworker (#48808)
Scroll Saw (#37805)
Using the Shaper to Make Panel Doors (#00310)
What Is Measurement (#15506)
Working With Scales (#49709)

B. Available from Industrial Arts Education Service, State Department of Education, P. O. Box 6Q, Richmond, Virginia 23216

In-Class AIASA Management (TV tape)
Move With Tomorrow (slides)
Organizing the Industrial Arts Student Organization (slides)

II. Films, filmstrips, audiovisual kits, slides, or TV tapes available from other suppliers

A. Abraxas Films, P. O. Box 146, Eugene, Oregon 97440

Basics of Glueing and Clamping
Circular Table Saw Safety
Computing a Bill of Materials
Hand Held Power Tool Safety
Hand Held Power Tool Safety and Hand and Power Sanding
Hand Tool Safety
Industrial Arts Skill and Safety Series
Introduction to Woodshop/Carpentry Safety
Planer, Disc Sander, Drill Press and Grinder Safety
Radial Arm and Band Saw Safety
Shaper and Scroll Saw Safety
Tools for Measuring Wood

B. Bergwall Productions, Inc., 839 Stewart Avenue, Garden City, New York 115

Woodworking Explained (#701) includes: How to Draw a Working Plan; Basic Layout Techniques; How to Cut Stock; Planing, Drilling and Boring; Sanding; Basic Assembly Techniques; and Finishing
Woodworking Machine Operation (#702) includes: Operating the Circular Saw, Operating the Scroll Saw, Operating the Band Saw, Operating the Jointer, Operating the Drill Press, Operating the Woodworking Lathe, Faceplate Turning on the Woodworking Lathe
Woodworking Hand Tools Explained (#703) includes: Measuring Tools, Marking Tools, Cutting Tools, Wood Planes, Forming and Shaping Tools, Files and Finishing Tools

C. BFA Educational Media, 468 Park Avenue South, New York, New York 10016

Portable Power Saw (A/V kit)

D. Career Aids, Inc., 8950 Lurline Avenue, Department 987, Chatsworth, California 91311

Millwork Machines (#DXMWMOO)
Woodworking: Hand Tools (A) (#EA02600)
Woodworking: Hand Tools (B) (#EA02700)
Woodworking: Power Tools (#EA02800)
Using Portable Power Tools (#GFS)

Woodworking: Layout (#PX916)
Woodworking: Assembly with Screws, Glues, Clamps, and Joints (#PX917)
Woodworking: Finishing (#PX918)
Woodworking: The Lathe (#PX937)
Woodworking: Power Saws (#PX938)
Woodworking: Producing Joints (#PX1120)
Woodworking: Power Machines (#PX1170)
The Surface Planer (#PX1171)
Bench Sanders (PX1172)
The Jointer (#PX1174)
Practical Woodworking (#RM8130-S)
Advanced Woodworking (#RM8135-S) includes: Planning, Material Selection, Initial Forming Operations, Intermediate Forming and Shaping, Final Parts Shaping, Combining and Finishing
Woodworking Power Tools (#RM880S)

E. DCA Educational Products, available from Progressive School Products,
2856 Lamb Place, Memphis, Tennessee 38118

Planer (Filmstrips and cassettes, 5-part series)

F. Interpretive Education, Department DM, 2306 Winters Drive, Kalamazoo,
Michigan 49002

Measures in a School Shop (#149)
Hand Tools in a School Shop (#160)
Shop Safety (#102)

G. Jam Handy School Services, Prentice-Hall Media, 150 White Plains Road,
Tarrytown, New York 10591

Woodworking Tools and Machines: Drill Press
Woodworking Tools and Machines: Jig Saw

H. Lawren Productions, Inc., P. O. Box 1542, Burlingame, California 94010

The Kindest Cut: Story of a Saw Mill

I. McGraw-Hill Book Company, 110 15th Street, Delmar, California 92014

Design in Wood
Hardwood Processing
Joining and Glueing
Lathe (filmloops, 5-part series)
Safe Shop

J. McKnight Publishing Company, Box 2854, Bloomington, Illinois 61701

The Tilting Arbor Table Saw (#6906M)
The Jointer and the Planer (#6907M)
The Radial Arm Saw (#6908M)
Sanding Machines (#6911M)
The Band Saw and Scroll Saw (#6912M)
The Drill Press and Hollow Chisel Mortiser (#6913M)

K. National AIASA, 1908 Association Drive, Reston, Virginia 22091

AIASA -- A Classroom Experience (slides)

L. Popular Science, distributed by Denoyer Geppert Audio-Visual, Times Mirror, 5235 Ravenswood Avenue, Chicago, Illinois 60604

Designs in Wood

M. Prentice-Hall Media, ServCode VD3, 150 White Plains Road, Tarrytown, New York 10591

Woodworking: Hand Tool Operations (#936) includes: Planes and Their Uses, Saws and Sawing, Fastening Wood Parts, Fastening with Dowels, Various Woodworking Operations
Woodworking: Power Tools (#VD1116) includes: The Router-Part 1, The Router-Part 2
The Electric Hand Drill (#VD1117)
The Saber Saw (#VD1118)
The Circular Saw (#VD1119)

N. R.M.I. Film Productions/Coleman Film Enterprises, 701 Westport Road, Kansas City, Missouri 64411.

Advanced Woodworking: Final Parts Shaping
Advanced Woodworking: Material Selection
Advanced Woodworking: Project Planning

O. Singer Career Systems, 80 Commerce Drive, Rochester, New York 14623

Stationary Power Tools (#5-210B) includes: Drill Press and Radial Arm Saw
Clamps: Types and Uses (#55-226)
Sharpening Woodworking Hand Tools (#55-262)
Wood Chisels: Care and Uses (#55-286)
Handsaws: Types and Uses (#55-289)
Portable Power Tools (#5-290B) includes: Drill, Saws, Sander, Router
Fastening Materials (#55-240) includes: Wood Screws, Nails, Glues and Adhesives
Manufacturing: People, Processes, and Products includes: Selecting a Product to Manufacture, Organizing an In-School Company

P. Stanley Tools, P. O. Box 1800, New Britain, Connecticut 06050.

Super 8mm Film Loops for Hand Tools

Q. Sterling Educational Films, 241 East 34th Street, New York, New York 10016

Measuring and Layout Tools
Scroll Saw

R. Teaching Aids, Inc., P. O. Box 1798, Costa Mesa, California 92626

Tools for Measuring Wood (#A-2B1)
Basics of Glueing and Clamping (#A-2B2)
Computing for a Bill of Materials (#A-2B3)
Laminated Wood Bending and Carving (#P1125)
Wood: The Unique Material (#P1122) includes: Physical Properties, Lumbering, Processed Products

S. Universal Education and Visual Arts, 1000 Universal City Plaza,
Universal City, California 91608

Hand Tools: Cutting Tools

T. U.S. Army, National Audio-Visual Center, Washington, D.C. 20401

Measuring, Marking and Leveling Tools (F#202560/QO)
or videocassette (#A0641311/QD)
Planing and Chiseling Tools (F#202562/OD)
or videocassette (#A06416/QD)
Shaving and Boring Tools (Videocassette #A06416/QD)

III. Transparencies and duplication masters

A. DCA Educational Products, available from Progressive School Products,
2856 Lamb Place, Memphis, Tennessee 38118.

Basic Construction Details
Stationary Power Tools: Circular Saw I and II
Wood Technology

B. DCA Educational Products, available from Graves-Humphreys, Inc.,
1948 Franklin Road, Roanoke, Virginia 23033.

Overarm Router
Woodworking Basics: Abrasives and Abravise Grit Size
Woodworking Basics: Nails and Nailing and Wood Screws
Woodworking Hand Tools: Forming Tools and Files
Woodworking Hand Tools: Scraping Tools

C. Milliken Publishing Company, 1100 Research Boulevard,
St. Louis, Missouri 63132

Trees, Wood and the Woodworking Industry (#TDT61)
Wood Joints (#TDT62)
Shop and Home Safety Series (#TDT20)
Tool Identification and Features Series (#TDT30)

D. Stanley Tools, P. O. Box 1800, Ne Britain, Connecticut 06050

Transparencies of 38 Woodworking Tools (#94-390)

E. Teaching Aids, Inc., P. O. Box 1798, Costa Mesa, California 92626

Safety in the Woodshop (#D-1WB000)
Cutting Tool Details (#D-2WB000)
Squaring and Building Up Stock (#D-3WB000)
Adhesives and Glues (#D-4WB000)
Joints (#D-5WB000)
Basic Construction Details (#D-6WB000)
Fasteners (#D-7WB000)
Smoothing and Finishing (#D-8WB000)
Safety: Portable Power Tools (#D-4SMP000)
Safety: Stationary Power Tools (#D-2SMP000)

IV. Charts, signs, booklets, and posters

A. Safety Rules, 3727 Joan Drive, Waterloo, Iowa 50702

Safety Rules at Machines (laminated signs)
Safety Rules for the Wood Shop (booklets)
Wood Shop Safety Rules (poster)

B. Stanley Tools, P. O. Box 1800, New Britain, Connecticut 06050

Instruction Charts of Tools (#94-305)
Tool Safety Charts (#94-295)

APPENDIX B

PROJECT IDEAS AND SOURCES

I. Books

Capotosto, John. Furniture Making and Finishing. New York: Prentice-Hall, 1979.

Capron, J. Hugh. Wood Laminating. Bloomington, Illinois: McKnight Publishing Co., 1963.

Conservative Modern Furniture Designs. New Britain, Connecticut: Stanley Tools.

Douglass, J. H. Projects in Wood Furniture. Bloomington, Illinois: McKnight Publishing Co., 1967.

Early American Plans. New Britain, Connecticut: Stanley Tools.

Fine Woodworking Biennial Design Book One and Design Book Two. Newtown, Connecticut: The Taunton Press, 1977, 1979.

Fine Woodworking Techniques 1, 2, and 3. Newtown, Connecticut: The Taunton Press. 1978, 1980, 1981.

Gottshall, F. H. Furniture of Pine, Poplar and Maple. Encino, California: Bruce Publications, 1966.

The Hands On Book from Industrial Education. Stamford, Connecticut: Industrial Education, 1978.

Lindbeck, John. Design Textbook. Bloomington, Illinois: McKnight Publishing Co., 1972.

Maguire, Byron. Simple Furniture Making and Refinishing. New York: Prentice-Hall, 1977.

Marlow, A. W. Fine Furniture for the Amateur Cabinetmaker. New York: MacMillan, Inc., 1965.

McGinnis, Harry and Ruley, M. J. Basic Woodwork Projects. Bloomington, Illinois: McKnight Publishing Co., 1959.

O'Neill, James. Early American Furniture. Bloomington, Illinois: McKnight Publishing Co., 1963.

Philbin, Tom. *Cabinets, Bookcases and Closets*. Costa Mesa, California: Teaching Aids, 1975.

Romero, A. C. *Contemporary Designs for Wood*. Encino, California: Bruce Publications, 1966.

Sibley, Hi. *Wood Projects*. South Holland, Illinois: Goodheart-Willcox, 1975.

Spence, William P. and Griffin, Duane. *Woodworking: Tools, Materials, Processes*. Alsip, Illinois: American Tech, 1981.

Spielman, Patrick. *The Basic Book of Woodworking*. Alsip, Illinois, American Tech, 1979.

Stanley You-Can-Do-It Project Plans. New Britain, Connecticut: Stanley Tools.

Tage Frid Teaches Woodworking--Joinery: Tools and Techniques. Newtown, Connecticut: The Taunton Press, 1979.

Tage Frid Teaches Woodworking--Shaping, Veneering, Finishing. Newtown, Connecticut: The Taunton Press, 1981.

Woodworking Project Plan Series. New Britain, Connecticut: Stanley Tools.

II. Catalogs

Teachers may write to the following addresses requesting gift catalogs. These catalogs will provide students with many creative project/product ideas.

Charles Keath, Ltd.
4030 Pleasantdale Road, N.E.
Atlanta, Georgia 303040

Chris Craft
Algonac, Michigan 48001

Clocks, Cabinets and Works
Emperor Clock Co.
Emperor Industrial Park
Fairhope, Alabama

Friend Ship Store
Shopping Service
P. O. Box 2001
3825 W. Green Tree Road
Milwaukee, Wisconsin 53201

Friendly Pine By: Yield House
Gift & Home Catalog
Department 262
North Conway, New Hampshire 03860

Hard-To-Find Tools and Products
Brookstone Company
118 Brookstone Building
Peterborough, New Hampshire 03458

Heath Craft Woodworks
Heath Company
Benton Harbor, Michigan 49022

Klockit, Face and Movement Catalog
P. O. Box 629
Lake Geneva, Wisconsin 53147

Miles Kimball
41 W. Eighth Avenue
Oshkosh, Wisconsin 54901

Old Guilford Forge
Retail Shop: 76 Broad Street
Office and Factory: 1840 Boston Post Road
Guilford, Connecticut 06437

Pitsco's Catalog of Activities, Kits,
and Aids
Pitsco, Inc.
Box 1328
Pittsburg, Kansas 66762

Sturbridge Yankee Workshop
Brimfield Turnpike
Sturbridge, Massachusetts 01566

The American Heritage Collection
205 W. Center Street
Marion, Ohio 43302

III. Magazines

Fine Woodworking. Published by The Taunton Press, 52 Church Hill Road, Box 355, Newtown, Connecticut 06470.

Great Possibilities. Published quarterly by Georgia-Pacific, 900 S. W. Fifth, Portland, Oregon 97204.

Hands On. Shop Smith, Inc., 750 Center Drive, Vandalia, Ohio 45377.

Industrial Design Magazine. Published by Whitney Division of Billboard Publishing, Inc., One Astor Plaza, New York, New York 10036.

Early American Life. Published by The Early American Society, Inc., P. O. Box 2534, Boulder, Colorado 80321.

Rockwell Power Tool Instructor. Published by Rockwell Manufacturing Company, 400 N. Lexington Avenue, Pittsburgh, Pennsylvania 15208.

APPENDIX C

RESOURCES FOR RESEARCH IN WOODS TECHNOLOGY

I. Books

Earl, Arthur W. Experiments With Materials and Products of Industry. Bloomington, Illinois: McKnight Publishing Co., 1960.

Farmer, R. H. Chemistry in the Utilization of Wood. Elmsford, New York: Pergamon Press, 1967.

Forest Products Laboratories. Wood Handbook. Madison, Wisconsin: U. S. Department of Agriculture.

Hoadley, Bruce. Understanding Wood: A Craftsman's Guide to Wood Technology. Newtown, Connecticut: The Taunton Press, 1979.

Lindbeck, John R. Designing Today's Manufactured Products. Bloomington, Illinois: McKnight Publishing Co., 1972.

II. Sources for Technical Information

American Plywood Association
119 A. Street
Tacoma, Washington 98407

Appalachian Hardwood Association
NCNB Building, Room 408
164 S. Main Street
High Point, North Carolina 27260

California Redwood Association
617 Montgomery Street
San Francisco, California 94111

Forest Products Laboratories
U. S. Department of Agriculture
P. O. Box 5130
Madison, Wisconsin 53705

NASA Tech Briefs
Technology Transfer Division
P. O. Box 8757
Baltimore/Washington International
Airport, Maryland 21240

U. S. Plywood
P. O. Box 216
Wynnewood, Pennsylvania 19096

Virginia Department of Forestry
P. O. Box 3758
Charlottesville, Virginia 22903

Western Wood Products Association
Yeon Building
Portland, Oregon 97204

National Hardwood Lumber Association
332 S. Michigan Avenue
Chicago, Illinois 60604

Southern Forest Products Association
P. O. Box 52468
New Orleans, Louisiana 70152

APPENDIX D

APPROVED TOOLS AND EQUIPMENT

I. Equipment

ITEM NUMBER	QUANTITY	DESCRIPTION
1	5	Wood top work benches with vises and locker base
2	20	Stools for work benches
3	1	Scroll saw
4	1	Circular saw, 10"
5	1	Spindle sander
6	1	Disc and belt sander
7	1	Band saw, 20"
8	3	Wood lathe, 12"
9	1	Glue bench
10	1	Clamp rack
11	1	Shaper
12	1	Jointer, 6"
13	1	Surfacer, 18"
14	1	Radial arm saw, 10"
15	1	Mortiser
16	2	Drill press, 15"
17	1	Grinder, tool (slow speed)
18	1	Tool storage cabinet
19	2	File cabinet, 4-drawer w/complete apparatus
20	1	Spray booth

ITEM NUMBER	QUANTITY	DESCRIPTION
21	1	Demonstration bench
22	1	Cabinet, finishing materials (fireproof)
23	1	Cabinet, nail and screw
24	1	Dust collection system
25	1	First aid cabinet
26	1	Cabinet, safety glass storage
27	1	Rack, lumber storage
28	1	Rack, plywood storage
29	1	Table, drafting
30	1	Table, finishing
31	2	Saw, saber (bayonet)
32	2	Drill, hand, 1/4"
33	2	Drill, hand, 3/8"
34	2	Sander, vibrating
35	2	Sander, belt
36	1	Router
37	3	Woodturning tool sets
38	1	Projector, 16mm movie
39	1	Projector, filmstrip
40	1	Projector, slide
41	1	Projector, overhead
42	1	Tape recorder, cassette
43	1	TV monitor
44	1	Screen, projection

II. Tool/Apparatus Supplies

ITEM NUMBER	QUANTITY	DESCRIPTION
1	2	Awl, brad
2	4	Awl, scratch
3	4	Bellows, molder's
4	2 Sets	Bit, auger, sizes 4-16
5	1 Set	Bit, combination drill and countersink numbers 1-5
6	1 Set	Bit, combination drill and counterbore
7	1	Bit, electrician's
8	1	Bit, expansive boring, sizes from 7/8" to 3"
9	1	Bit, extension, 18"
10	1 Set	Bit, Forstner (brace set), sizes 6, 8, 10, 12, 14, 16 by 16ths of an inch
11	1 Set	Bit, Forstner (machine set), 1/2" shank; sizes 6, 8, 10, 12, 14, 16 in 16ths of an inch
12	1 Set	Bit, multi-spur, set of 11; sizes 1/2"--1" by 16ths; plus 1-1/8" and 1-1/4"
13	1 Set	Bit, plug cutter, set of 5; sizes 3/8", 1/2", 5/8", 3/4", 1"
14	1	Bit, electrician's twist, 3/8" x 18" with square tang
15	4	Brace, ratchet, 10"
16	6	Broom, push, 18" in length
17	12	Brush, bench
18	1	Burnisher, round tempered steel; 4-1/2" blade
19	1	Can, oily waste, 10-gallon capacity
20	4	Can, safety, 1 qt.
21	3	Can, safety, 1 gal.

ITEM NUMBER	QUANTITY	DESCRIPTION
22	12 Sets	Chisel, butt, 3" blade; sizes 1/4", 1/2", 3/4", 1", 1-1/2"
23	4 Sets	Chisel, carving, set of 6 chisels and gouges; approximately 6" long
24	3 Sets	Chisel, gouge, inside, sizes 1/4", 3/8", 1/2", 3/4", 1"
25	4 Sets	Chisel, gouge, outside, set of 5; sizes 1/4", 3/8", 1/2", 3/4", 1"
26	4 Sets	Chisel, socket firmer, set of 6; sizes 1/4", 3/8", 1/2", 5/8", 3/4", 1"
27	3 Sets	Chisel, woodturning, overall length at least 17"
28	1	Circle cutter, 1" to 8" diameter capacity
29	6	Clamp, bar, 36"
30	6	Clamp, bar, 48"
31	4	Clamp, "C," 3"
32	4	Clamp, "C," 4"
33	4	Clamp, "C," 6"
34	4	Clamp, "C," 8"
35	4	Clamp, corner, 3" capacity
36	6 Sets	Clamp, fixture, for use with 3/4" pipe
37	6	Clamp, handscrew, no. 3/0
38	6	Clamp, handscrew, no.0
39	12	Clamp, handscrew, no. 1
40	12	Clamp, handscrew, no. 2
41	6	Clamp, handscrew, no. 3
42	1	Clamp, miter frame
43	3	Compass, pencil
44	2 Sets	Countersink bit (for brace) sizes 5/8" - and 3/4"

ITEM NUMBER	QUANTITY	DESCRIPTION
45	2	Countersink, high speed, 1/4" shank, 1/2" size
46	1	Cutter, glass
47	2	Divider, wing, 6" steel
48	1 Set	Dowel centers (pairs), 1/4", 5/16", 3/8", 1/2"
49	1	Dresser, abrasive wheel
50	1	Drill stand (fractional) for twist drills from 1/16" to 1/2" by 64ths
51	1 Set	Drill, twist, straight shank (fractional set) high speed number 2 Morse; taper shank, 5/8" to 1" by 8ths
52	1 Set	Files (assorted sizes, shapes, and cuts, with handles)
53	3	File, auger bit, 7"
54	6	File card and brush 9-1/2" long, brush 1-1/2" x 5"
55	2	Funnel
56	1	Gauge, auger bit gauging hole depth
57	1	Gauge, drill, fractions
58	6	Gauge, marking
59	2	Gauge, marking (double bar)
60	1	Gauge, screw pitch with 22 pitches from 9 to 40
61	1	Gauge, wire and sheet metal (American) sizes 0-36
62	1	Gauge, wire and sheet metal (U.S.S.) sizes 0-36
63	4 pairs	Gloves, leather
64	1	Grease gun
65	3	Hammer, claw, 7 oz.
66	6	Hammer, claw, 13 oz.
67	6	Hammer, claw, 16 oz.
68	2	Hammer, magnetic standard upholstered
69	2	Jig, dowelling with guides

ITEM NUMBER	QUANTITY	DESCRIPTION
70	3	Knife, putty
71	1	Level, 24" long
72	4	Mallet, hardwood
73	4	Mallet, rawhide, 10 oz.
74	1	Miter box
75	4 Sets	Nail set, 1/16" tip
76	4 Sets	Nail set, 3/32" tip
77	1	Nipper, end-cutting, 6"
78	6	Oiler, bench, 1/3- or 1/2-pt. size, 5" straight spout
79	1	Oiler, pump, 5 oz. capacity
80	1 Set	Oilstone, carving tool slips
81	1	Oilstone, combination, India coarse and fine grit; 8" x 1" x 2"
82	1	Oilstone, gouge slip
83	1	Pan, dust, 12" steel
84	3	Plane, block, 1-5/8" cutter
85	20	Plane iron, double
86	10	Plane, jack, 14" long
87	2	Plane, jointer 22" long
88	4	Plane, rabbet, 4" long, 1" cutter
89	4	Plane, router with 3 cutters 1/4", 1/2" and V
90	5	Plane, smoothing, blade 9" long, 1-3/4" wide
91	2	Pliers, combination, 6"
92	2	Pliers, vise-grip wrench, 7"
93	2	Protractor, machinist's bevel, 12" blade
94	3 Sets	Punch, center, set of 5: 1/16" to 1/4"

ITEM NUMBER	QUANTITY	DESCRIPTION
95	4	Rule, flexible, steel tape, 10'
96	1	Rule, flexible, steel tape, 100'
97	20	Rule, steel, 12"
98	5	Rule, steel, 24"
99	3	Rule, steel, 36"
100	1 Set	Sanding drums
101	5	Saw, back, 12"
102	10	Saw, coping, 6-1/2" long, pin-end
103	1	Saw, hack, hand
104	4	Saw, hand, crosscut, 22" - 10 point
105	4	Saw, hand, rip, 26" - 5-1/2 point, straight back
106	1	Saw, keyhole, 10" taper; round blade
107	4	Saw, veneer
108	1	Scale, architect's
109	4	Scissors, 8"
110	4	Scraper, cabinet
111	6	Scraper, hand, approximately 3" x 5" steel blade
112	1	Screwdriver, offset ratchet
113	2 Sets	Screwdriver, offset, straight slot
114	2 Sets	Screwdriver, Phillips, set of points
115	2	Screwdriver, spiral ratchet
116	2 Sets	Screwdriver, standard bit (round blade)
117	10	Shield, face
118	4	Spokeshave, convex bottom
119	4	Spokeshave, straight
120	4	Square, combination, 12"
121	6	Square, steel framing, 12" x 24"

ITEM NUMBER	QUANTITY	DESCRIPTION
122	20	Square, try, 6"
123	4	Square, try, 12"
124	3	T Bevel, 6"
125	2	Trammel points
126	6	Triangle, 30 degrees - 60 degrees, 8"
127	6	Triangle, 45 degrees, 8"
128	6	T square, minimum size 24"
129	1	Vise, bench, drill, 3" opening
130	1	Vise, miter
131	1	Wrench, adjustable end, 8"
132	1 Set	Wrench, Allen key, hex
133	1 Set	Wrench, open end
134	1 Set	Wrench, socket (3/8 drive), 10-piece set, 7 standard sockets; 3/8" to 3/4" by 16ths

III. Educational Media

ITEM NUMBER	QUANTITY	DESCRIPTION
1	1	AIASA Chapter Banner
2	1 Set	AIASA Officers' Symbols (8)
3	1	Robert's Rules of Order

One copy of each curriculum guide distributed by the Industrial Arts Education Service must be available to each teacher.

Good judgment should be used in making available a variety of up-to-date audiovisual materials in a quantity sufficient for the teacher to provide for individual needs in a competency-based system. Audiovisual materials and teaching aids include films, slides, tapes, records, transparencies, models, charts, graphs, exhibits, and other such types of materials.

More specific and detailed information on these materials can be furnished by the Industrial Arts Education Service.

The Virginia Department of Education does not unlawfully discriminate on the basis of sex, race, color, religion, handicapping conditions, or national origin in employment or in its educational programs and activities.

The activity which is the subject of this report was supported in whole or in part by the U. S. Department of Education. However, the opinions expressed herein do not necessarily reflect the position or policy of the U. S. Department of Education, and no official endorsement by the U. S. Department of Education should be inferred.